

THE TECHNIQUE
OF
OPERATIVE SURGERY.

BY
J. L. JOHNSON, M. D.

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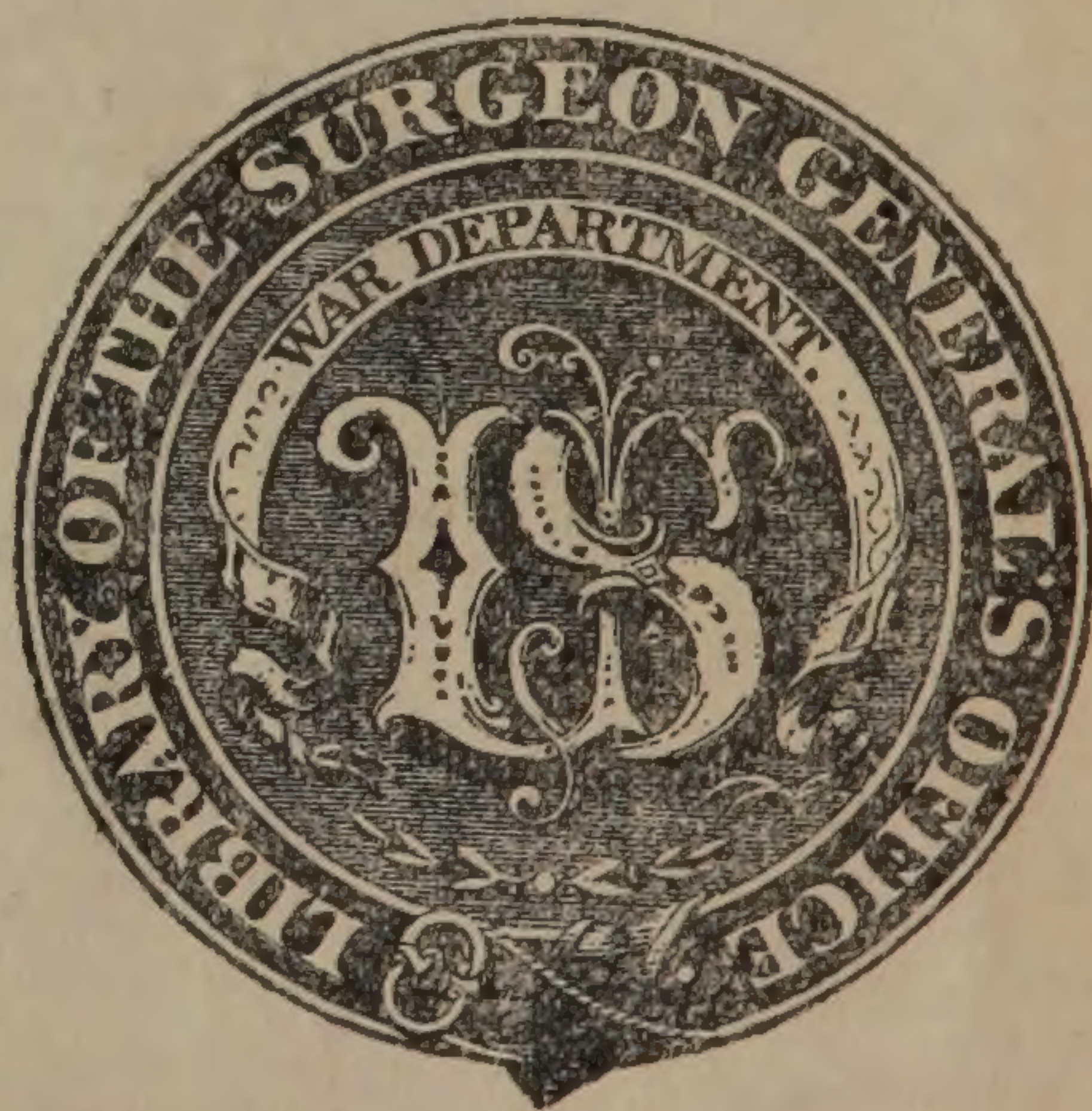
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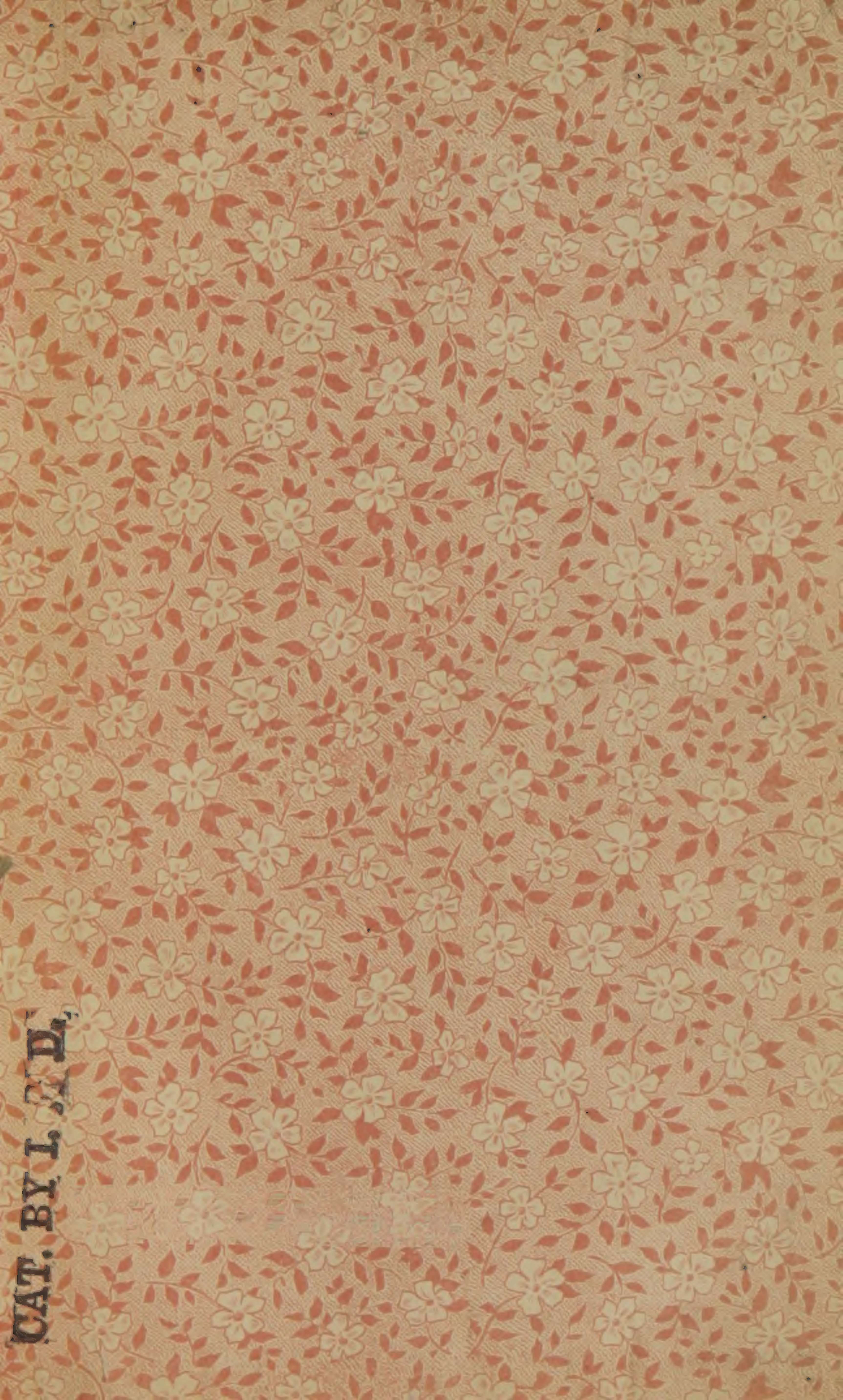
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J. L. JOHNSON, M. D.,

LOUISVILLE, KY.

NOVEMBER, 1898.

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PREFACE.

MY object in placing this little book before the profession is not that it may aspire to a position among medical text-books, but that it may become "guide, philosopher and friend" to the busy practitioner, aiding him in the countless emergencies which continually arise to tax the ingenuity and skill of the physician and surgeon. During a recent course of study in the New York Polyclinic, I was constantly urged by my fellow students to prepare for them and our professional brethren a copy of my notes, taken at this period. Somewhat averse to the proposition, I acceded, under the stipulation that the publication should be delayed until after a contemplated sojourn in Europe, where I hoped to profit by a course of study among the famous hospitals of the Old World. However, having decided to postpone my trip abroad for a few weeks, I have employed the interval in the preparation of this little volume, and now, on the eve of my departure for a foreign land, present this, the result of arduous labor and careful thought, to my professional friends, hoping it may find favor in the sight of those for whom it is intended.

J. L. JOHNSON, M. D.

JULY 25, 1896.

PREFACE TO SECOND EDITION.

THE first edition of this work having met with even more success than I had anticipated, has prompted me to offer a second edition and revision to the profession.

While in the European hospitals I enjoyed unusual facilities for the investigation of surgical knowledge, and to this edition have added the result of my labors. It has not been my purpose to speak of all operations known to surgery; or to enter into the etiology, pathology, and diagnosis of disease; but simply to give the operative technique of such operations as most frequently confront the surgeon.

In this preparation I have drawn largely upon the works of Dennis, Wyeth, and the American Text Book of Surgery; especially in asepsis, intestinal work, and the treatment of dislocations and fractures. The after-treatment of abdominal surgery, and in fact of all major operations, I have extracted in part from the American Text Book of Gynæcology.

Fraternally yours,

J. L. JOHNSON, M. D.,

201 West Walnut Street,

LOUISVILLE, KY.

NOVEMBER 1, 1898.

INSTRUMENTS.

Scissors Their Use and Method of Holding.

The scissors is one of the most important instruments belonging to the surgeon's armamentarium, and should be held, while in use, as a barber holds his shears—placing the thumb in one ring and the ring-finger in the other. The instrument is held steadily by placing the index finger against its jaws. Held in this manner, the scissors is under perfect control of the operator.

Forceps—Lion-Jawed.

The lion-jawed forceps, a very powerful instrument, is used only in bone surgery for the removal of fragments during operation, and for holding the bone steadily during the process of sawing.

Forceps—Rongeur.

This is a very powerful instrument, and its principal use is in operations upon the skull. Having removed a button of bone with the trephine or chisel, this forceps is substituted for the removal of any other portion of bone rendered necessary by the operation. The thin, flat blade is passed beneath the skull above the dura, and by repeated opening and closing of the forceps

the bone is gradually bitten away to any extent desired.

Forceps—Artery.

This most important instrument is so well known to the profession that I will merely suggest every surgeon should keep his cabinet well supplied with them. Personally, I prefer the Pean forceps.

Forceps—Hysterectomy.

In both vaginal and abdominal surgery this forceps is indispensable. The best and most beautiful ones are manufactured by Collin, of Rue de l'Ecole de Médecine 6, Paris, France, and are the Pean and its modifications.

Retractors.

Retractors should be included in every surgeon's armamentarium, both toothed and blunt. For vaginal and abdominal work Pean's toothed retractors are indispensable.

Speculum.

This time-honored instrument is not used so much as formerly. The Sims is one of the best, and is well-suited to operations on the cervix and anterior vaginal wall; although the Pean retractor may be used with better results. The use of the speculum has practically been aban-

done, both in diagnostic and operative work, by some of the leading surgeons of this country and of Europe. In St. Mark's Hospital, London, where, perhaps, more rectal work is done than in any other institution in the world, the speculum is rarely used for diagnostic purposes.

Trephine.

This once popular instrument has, of recent years, fallen largely into disrepute, especially with the leading surgeons; having been supplanted by the mallet and chisel, Hey's saw, and the rongeur forceps.

Saw—How to Use.

The handle of the saw is grasped in the right hand, its heel placed upon the bone to be sawed, and a number of backward strokes made by drawing the saw to you, in order to cut a groove in which the saw can run, before the regular sawing motion is begun. This prevents jumping of the saw and haggling of the bone and periosteum. In amputation of the forearm, both bones must be sawed through at the same time, while in the leg the fibula is sawed through first.

Knives—How to Hold.

The small knives are grasped between the index finger and thumb of the right hand, with the handle extending back into the palm and stead-

ied by the rest of the fingers. The surgeon never holds his knife as a writer holds his pen; this is unsurgical and produces an unfavorable impression upon those witnessing the operation. Amputating knives should be grasped firmly and held in any manner most suitable to the operation to be performed.

Other instruments will be spoken of in the connection in which they are used.

KNOTS—HOW TO TIE.

The surgeon's knot is made by tying the right end of the ligature over the left; second, by tying the left end over the right. This is also known as the sailor's knot, which, it is said, never slips. If the right end is tied over the right, or the left end over the left, we form what is known to the Germans as the "granny knot," which, however, often slips.

Knot—Friction.

The friction knot is, by far, the best and safest, and is practiced by all up-to-date surgeons, both in America and in Europe. It is formed by first making a double first turn of the ligature and tying twice more. Unless the ligature breaks one may feel assured that hemorrhage will not occur.

Knot—Staffordshire.

Pass a double ligature through the pedicle, and bring the loop over the end of the stump to the point of insertion; draw one end of the ligature above the loop, and the other below, and tie tightly. This is the best manner in which the stump of a pedicle can be ligated; as, when properly applied, it never slips off.

Knot—Spencer Wells or Allingham.

Pass a double ligature through the pedicle and cut the needle loose; twist the ligature on itself and tie on both sides; then carry the ligature completely around the pedicle and tie as a whole. With this ligature properly applied, hemorrhage is practically impossible.

Knot—Balance and Edmunds.

This knot is only used for ligating large blood-vessels. This ligature consists of dentist's floss silk. A skein of silk is passed around the vessel and tied with a double first turn, when a second skein is placed by the side of the first and tied with a double first turn. The four ends of the two ligatures are then tied together and the knot completed. The object of this knot is to spread out over the vessel, that its internal coats may not be injured, while at the same time the circulation is controlled.

SUTURES.

Sutures are of two classes — retention and coaptation. In all major operations, such as amputations, laparotomies and amputations of the breast, both retention and coaptation sutures should be employed. In closing wounds, when the edges are difficult to approximate, always use retention sutures, to bring the edges of the wound into apposition, in order that the apposition sutures may be introduced and tied.

Suture—Purse-string.

This suture is best used in the ligation of small stumps, as it does not entirely cut off the circulation, thereby allowing it to heal without sloughing. It is also a valuable accessory in closing small wounds of the intestines. To prevent sutures cutting into the tissues, perforated strips of sheet lead may be used for the passage of the sutures. Rubber tubing, buttons, or the quill suture may be used with good results.

Suture—Quill.

Use a double ligature, and loop it over the quill, smooth stick, or rubber tube. By making traction on the ligature, the quill is brought snugly along the side of the wound, exerting

firm pressure throughout the length of the incision. Secondly, tie a single knot on the opposite side of the wound, placing the other quill between the two ends of the ligature, and tie tightly enough to perfectly coaptate the edges of the wound.

At one time the quill suture was employed for the purpose of approximating the deep structures of wounds; but it has in recent years been supplanted by the use of catgut, kangaroo and deer tendon, which are employed as buried sutures for this purpose.

Instead of the quill, bits of rubber tubing one inch in length are employed by many prominent surgeons, where the use of retention sutures are necessary. The suturing is begun by passing the needle through the upper angle of the incision and tying. As each succeeding suture is passed, a section of tubing is slipped over the needle, always being sure that the stitch is slightly longer than the piece of tubing used. This suture is ended in the same way in which it is begun, tying in the last suture a bit of tubing.

Sutures, Retention—Introduction of.

These sutures should, when possible, be introduced one or two inches from the edge of the wound. Under no circumstance should the

sutures be tied so tightly as to constrict the parts to such a degree that suppuration will be induced. Usually from four to six sutures are quite sufficient for the closure of ordinary wounds.

Sutures—Apposition.

Apposition sutures are of two varieties—continuous and interrupted. If the continuous suture is employed, begin at the middle of the wound, with a needle upon each end of the thread, and sew toward both ends of the incision. This technique prevents puckering of the wound. If the interrupted suture is used, begin sewing at the middle of the wound. In passing the sutures, have an assistant hold up the edges of the wound and introduce the needle through both sides at the same time, thus securing more perfect coaptation.

Suture—Buttonhole.

Pass the suture through both flaps at the end of the wound and tie; then pass the needle at right angle to the flaps and loop the thread over it, at the same time making tension on both ends of the thread.

This suture, when properly applied, forms a lock stitch, and is extensively employed for the closure of superficial wounds.

Suture—Subcuticular (Halstead).

Pass the needle subcuticularly — one-fourth of an inch from the edge of, and parallel to, the wound — beginning at one end and continuing, with stitches one-fourth of an inch long, first in one side of the wound, then the other, until the opposite end is reached; when the suture is ended as begun, by drawing it tightly and tying it subcuticularly, or by passing each end of the suture through a perforated shot, which is tightly clamped, after having made the suture tense.

This suture is especially applicable in closing wounds of the face, neck, and hands, where it is desirable that no scar shall remain. After introduction of the suture, it is well to paint over the line of the incision with flexible collodion, thus preventing infection and gaping of the wound. Halstead prefers silk for this suture, though many surgeons use catgut, as it is readily absorbed; others preferring silkworm gut, or silver wire, securing the ends with perforated shot.

Suture—Autopsy or Baseball.

Tie a large knot on the end of the thread; beginning at the end of the wound, the needle is passed from within, out through the skin, and continued in this manner to the opposite end of the wound and tied. This suture is used only in

post-mortems, as it rolls the edges of the skin in, producing a wavy line.

Suture—Glover's.

This suture is begun at the end of the wound, passing the needle from right to left toward the operator. This is a continuous suture, and, running zigzag, does not coaptate the parts so completely as does the buttonhole suture.

Sutures—Composition of.

Among the various materials used for sutures in surgical work, I will mention the following: Silk, flax and cotton thread, silkworm gut, cat-gut, kangaroo-tail tendon, deer tendon, horse-hair and silver wire. The number of sutures used in the closing of wounds should be as few as possible, each additional one being another chance for infection. If silkworm gut is used, the sutures should be introduced some distance from the edges of the wound, tied four times and the ends left long, to prevent slipping.

Sutures, Silver—Introduction of.

Thread a needle with a double thread, bend the end of the wire and hook into the loop of the thread, press closely and draw the suture into place. Before the suture is twisted it must be shouldered over the blades of a sharp-pointed

scissors, after which it is steadied with the slit end of a grooved director and twisted with an artery or dressing forceps. These instruments answer the purpose as well as the more expensive sets made for this work.

Suture—How to Mend.

Often in the midst of an operation our thread breaks. Simply pick up the broken end with the thumb forceps, having assistant tie another thread around it close to the tissues; turn the short broken end down, and loop the new thread over it. This renders the thread quite secure, and suturing may be continued.

Sutures—How to Tie.

Sutures should be tied only tight enough to perfectly coaptate the parts. There must absolutely be no tension; otherwise, stitch-hole supuration will occur.

Sutures—How to End.

Hold the free end of the thread between the thumb and finger, saw the thread to its middle and tie two ends to one.

Suture—(Lembert).

This suture is extensively employed in intestinal work, and will be described under the head of intestinal repair.

INCISION—HOW TO MAKE.

Gauge the point of the knife by placing the finger on the blade, and plunge it through the skin at a right angle, that the end of the incision may be cut as deeply as is its middle. End the incision by raising the knife to a right angle.

If the above technique is adhered to, the wound will be of uniform depth throughout. In all operations make a free incision; a large wound, if aseptic, heals as readily as a small one. McBurney, Wyeth, Macewen, and other distinguished surgeons advise free incisions under all circumstances. The eminent James R. Wood once remarked that he would not operate unless there was room in which to make a six-inch incision.

FLAPS—HOW TO MAKE.

Flaps should rarely be made by transfixion or cutting from within outward, as the skin retracts, and the muscles and blood-vessels are cut across obliquely. Cuff flaps are preferred in all amputations of the extremities, except in amputation of the elbow-joint, where transfixion is done. Directions for making the cuff flap will

be given under the head of amputations. In all operations upon the extremities the limb should be elevated, the blood milked out and an Es-march bandage applied, extending from the toes or fingers, to a point above the seat of operation. This precaution controls the circulation, consequently we have no hemorrhage to fear.

HEMORRHAGE—HOW TO CONTROL.

This is accomplished in various ways; first, by position; second, by the application of heat or cold; third, by pressure; fourth, by torsion; fifth, by ligation. The use of styptics has long since been abandoned, the result of their uncleanness and uncertainty of action.

WOUNDS—HOW TO RENDER ASEPTIC.

This is effected by irrigating the wound with a 1 : 2,000 or 3,000 bichloride solution. When the dirt is all removed, bathe the wound well with spirits of turpentine and wipe dry with sterile gauze; then irrigate a second time with the bichloride solution, rendering the wound as nearly aseptic as it is possible to get it.

TRANSFUSION—HOW TO PERFORM.

In all operations of importance the surgeon should have everything in readiness for transfusing his patient in case of necessity.

It is executed in the following manner: a rubber tube is thrown around the arm, constricting and causing the veins to swell, when an incision one inch long is made at the bend of the elbow over the median basilic vein, exposing it. A catgut ligature is then passed around the vein at the distal end of the wound and tied. Secondly, another ligature of the same material is thrown around the vessel at the proximal end of the incision and loosely tied with a double first turn.

The vein is now opened and the nozzle of the transfusion apparatus introduced into the proximal end of the vessel, while the salt solution is flowing. The ligature is drawn tightly to constrict the vein around the glass nozzle. This precaution prevents the entrance of air into the vein. (The best transfusion apparatus is made by attaching to the tube of an ordinary three or four-quart fountain syringe the glass point of a medicine dropper.)

From one to two quarts of normal salt solution should be given to adults, a less quantity to younger people, according to age.

The solution consists of

Sodium Chloride, 3j.

Sterilized Water, Oj.

It should be as hot as the hand can be borne in it when injected into the vein. Upon the withdrawal of the nozzle of the syringe the temporary ligature is tightly tied, the wound closed, painted with iodoform collodion, and dry sterile dressing applied.

PATIENT—PREPARATION OF FOR OPERATION.

This is a department of surgery—the importance of which can not be overestimated—for upon it largely depends the result of the operation.

When it is possible, the patient should be given, four days prior to the operation, calomel in sufficient quantities to produce a free flow of bile; thus preventing its regurgitating into the stomach during anesthesia and causing intense vomiting.

The bowels must be freely opened several days before the operation, and maintained in a lax condition.

The urine must be rendered sterile by the administration of ten to twenty grains of saccharine per diem, for two or three days prior to operation. Or, better still, twenty drops of the following for two or three days before operating:

R Salol, ʒj.

Oleum Gaultheria, ʒij.

M. Ft. sol.

Sig. Gtt. xx, in capsules, every four hours.

Twenty-four hours before operating, the field of operation must be thoroughly scrubbed with green soap and water, after which a wet bichloride dressing is applied, over which is placed a square of rubber tissue and bandage. After patient is anesthetized, the dressing is removed, the parts scrubbed with green soap and water, or lysol (two-per-cent solution), shaved and scrubbed with ether and alcohol. Then a wet bichloride towel is left on until removed by the surgeon, in order that he may begin the operation.

The patient should not be permitted to take any nourishment on the morning of the operation, for reasons that will be explained under the head of anesthesia.

Everything connected with the operation is thoroughly sterilized by boiling—towels, ligatures, sponges, dressings and instruments, and in fact

everything, with the exception of the surgeon's hands and those of his assistants.

This preparation applies to all operations; it matters not how insignificant they may at first appear. If it is to be a vaginal operation, the vagina must be scrubbed well with green soap and water, and irrigated with a bichloride solution. The vagina is then packed with bichloride gauze twenty-four hours prior to operation. After the patient is anesthetized, the same process of scrubbing and sterilizing is necessary, as in any other operation.

SURGEON'S HANDS—PREPARATION OF.

The hands are washed with green soap, or a two-per-cent solution of lysol and hot water, for five minutes. The nails are scraped and the hands scrubbed for two minutes more, with soap and hot water, using a very stiff brush, in order that the hands may be made perfectly aseptic. The hands are then immersed in a saturated solution of potassium permanganas, then in a saturated solution of acid oxalic until the stain of the potash is removed; and, lastly, bathe the hands in a 1 : 5,000 bichloride solution. Now

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if the surgeon and his assistants observe scrupulous care in not touching anything, their hands are ready to proceed with the operation; otherwise, they must wash them again.

SPONGES—PREPARATION OF.

Take sponges, known as the Florida sheep's wool, and with a stick beat the dirt and calcareous matter out of them and place them in a solution of hydrochloric acid $\bar{5}$ ss, sterile aq. Oj, and let them soak twenty-four hours; then remove them from this solution, wash clean with sterile aq. and put them in a solution of pot. perman-ganas, grs. xxx, Oj of sterile aq., for half an hour. Remove them from the potash solution, wash clean in sterile aq., and put them in the following solution for two hours :

R Hyposulphite Soda, grs. v.
Hydrochloric Acid, $\bar{3}$ j.
Aqua Sterile, Oj.
M. Ft. sol.

The sponges are then removed from this solution, washed with hot water and put into a closely sealed jar containing either 1 : 1,000 bichloride solution or a five-per-cent carbolic solution,

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which is better, and left until required for use.

Shimmelbusch has devised the simplest and best mode of disinfecting sponges, which has given better satisfaction than any other plan yet originated. After the sponges have been freed from sand in the usual manner, they are rinsed in cold water, in which they are left to macerate for two weeks. They are then washed in warm water, to cleanse them from all dirt possible, and placed in a muslin bag. The bag containing the sponges is now immersed in a one-per-cent soda solution, which has been brought to the boiling point, and allowed to remain for thirty minutes. The bag is then removed from the soda solution and with its contents rinsed in plain boiling water. The sponges are then taken from the bag and placed in a jar containing either a sublimate solution 1 : 1,000, or a five-per-cent carbolic solution, and left until required for use.

Sponges—Artificial

Are made of squares of sterile gauze, eight or ten inches square, crushed into a ball; or, if smaller pieces, filled either with wood wool or absorbent cotton, over which the gauze is drawn and tied in a neck with a sterile cotton thread.

SUTURES AND LIGATURES— PREPARATION OF.

The substances used for tying vessels and for the approximation of wounds are either non-absorbable or absorbable. The non-absorbable are: Silk, silkworm gut, horse-hair, silver wire, cotton and linen thread.

The absorbable are: Catgut, kangaroo tendon and deer tendon (Marcy).

Catgut—Sterilization of.

FORMULA No. 1.

Take three sizes of catgut and soak it in benzine for forty-eight hours. Secondly, immerse it in ether forty-eight hours. Then take it from the ether and put it into a wide-mouthed bottle, which is filled with absolute alcohol. Place the bottle in the sterilizer, with the stopper loosely put in, and boil six hours; cork bottle tightly and remove it from the sterilizer. It is now ready for use. To render alcohol absolute, small bits of sheet gelatin are dropped into it to absorb the water, after which they are removed.

Catgut—Sterilization of (Bergman).

FORMULA No. 2.

Bergman's mode of sterilization is very reliable, and is regarded as the best. First, steril-

ize a vessel for three-quarters of an hour in steam and put into it raw catgut, which has been wound on glass bobbins, and supply sufficient sulphuric ether to cover the gut, and let it soak for twenty-four hours to free it from fat. Now, the ether is poured off and replaced by a solution of bichloride 10 parts, absolute alcohol 800 parts, and distilled water 200 parts. This alcohol solution becomes turbid after twenty-four hours, and must be renewed twice. After seventy-two hours this solution is replaced by pure absolute alcohol, in which the catgut is kept permanently for use.

Catgut—Chromicization of.

FORMULA No. 1.

Chromicized catgut is prepared as follows: To a five-per-cent carbolic acid watery solution is added crystalline chromic acid in the proportion of 1 : 4,000, in which the catgut remains immersed for forty-eight hours. Then it is taken out and kept in carbolic oil, 1 : 5.—Dennis' Surgery. (Gerster.)

FORMULA No. 2.

Dissolve chromic acid in water, making a saturated solution, and add enough of the solution to one pint of alcohol to make a one-per-cent solution; place in it the catgut to be chromicized and shake the bottle often. At the end of ten

days the gut has attained a brown color and is ready for use. It is now taken from the alcoholic solution and put into a solution of biniodide of mercury and kept until used. The longer the time the gut is allowed to remain in the acid solution, the longer it will stay in the tissues before absorbed.

Silkworm Gut—Sterilization of.

Put silkworm gut into a wide-mouthed bottle containing a five-per-cent solution of carbolic acid; cork tightly and boil in a water bath for half an hour. It is then ready for use.

Silk—Sterilization of.

Silk can only be perfectly sterilized by successive boilings. Boiled in a soda solution several times renders it nearer aseptic than in any other way. After sterilization it should be kept in a ten-per-cent carbolic acid solution for use. In fact, all non-absorbable suture or ligature material, should be boiled, at the time of operation, in the soda solution with the instruments, or subjected to steam, in the tray above, with the dressings.

Silver Wire—Sterilization of.

Silver wire is best sterilized, at the time of operation, by drawing it slowly through the flame of an alcohol lamp. Kangaroo and deer tendons are ready for use when bought.

DRESSINGS—PREPARATION OF.

Pure sterile gauze is made, by boiling gauze or cheese cloth for one hour in a five-per-cent solution of carbonate of soda; it is then boiled twice more in plain water for a few minutes; after which it is dried in the oven of the kitchen stove. Before boiling, the gauze must be cut into strips of desired size, that they may be packed into air-tight jars after sterilization.

Gauze, Bichloride—Preparation of.

Soak sterile gauze in a 1 : 2,000 bichloride solution and pack in air-tight jars. This gauze should be made in small quantities, as it deteriorates by long keeping.

Gauze, Iodoform—Preparation of.

Make a ten-per-cent ethereal solution of sterile crystallized iodoform, and put into it pure sterile gauze; cover the vessel containing the gauze, and let the ether evaporate; now wring the gauze out of a 1 : 4,000 bichloride solution, and dry in the oven of the stove; then pack it into sterile jars, cover gauze with sterile cotton, turn the jars upside down, place them in the sterilizer, and steam for three hours. The jars are then corked tightly and removed from the

sterilizer; the gauze being ready for use. Gauze prepared according to this formula can be left in the vagina, after a vaginal hysterectomy, for an indefinite length of time, without danger of iodoform poisoning. The best substitute for this gauze is plain sterile gauze boiled in a 1 : 5,000 bichloride solution and sprinkled with sterile iodoform crystals.

In the sterilization of dressings, the sterilizer should be lined with a large square of sterile gauze, the dressings packed inside and the gauze turned over them. Gauzes sold in boxes by retail druggists to the profession at large, though guaranteed, are very unreliable, and must, for security in all cases, be subjected to steam sterilization for half an hour at time of operation.—Dennis' Surgery (Gerster).

Iodoform—Sterilization of.

Put iodoform crystals into a wide-mouthed bottle containing a 1 : 500 bichloride solution and agitate the bottle often for three days; then let it settle and pour off the supernatant fluid; wash the iodoform with sterile water three times; then put the remaining powder in a clean saucer and dry in the stove. When dry, put the powder into a sterile bottle and cork tightly. It is now ready for use.

Iodoform Collodion.

R Iodoform, sterilized, grs. xlviiij.

Flexible Collodion, ℥j.

M.

Cork tightly and keep ready for use.

DRAINAGE.

Since Chassaignac introduced tubular drainage, it has held a steady sway in surgery. In suppurative cases, and where considerable fluid is liable to accumulate in cavities, this form of drainage is indispensable. In wounds, where the discharge will be aseptic, only a few strands of horse-hair, catgut, iodoform gauze or rubber tissue is necessary. All drainage tubes and other material used for drainage, must be perfectly aseptic before being introduced into the wound.

Drainage Tubes—Sterilization of.

Cut rubber tubing of several sizes into desired lengths, and boil in a one-per-cent soda solution for five minutes; then put the tubes into a large fruit jar with a screw top, which has previously been made aseptic by boiling top and jar in a five-per-cent soda solution for twenty

minutes. The jar is then filled with a five-per-cent solution of carbolic acid, tightly closed, and kept for use.

If this preparation has been strictly adhered to the tubes will keep for an indefinite length of time.

All dressings, sutures and drainage tubes should be taken from their receptacles with a pair of aseptic forceps, and when once out must never be returned, as the remaining portion is liable to be infected.

It depends upon the character of the fluid to be drained away as to what form of drainage is to be used. A very important aid to drainage is position of the parts. A well-drained wound does not need either squeezing or irrigation, though wounds that can not, for anatomical reasons, be drained must be kept clean by frequent irrigations with non-poisonous solutions, as salicylic acid or acetate of alumina. Nothing else should be used for this purpose. So long as the discharge is ichorous and purulent the dressings should be moist and frequently changed, but when the discharge has become bland then the dressings should be dry and continued until union is complete.—Dennis' Surgery (Gerster).

INSTRUMENT BAG—PREPARATION OF.

Take a pure, unlined leather bag, with a tightly-fitting top, and after thoroughly scrubbing it inside with a 1 : 1,000 bichloride solution, place in its bottom a sterilized towel, upon which the instruments are laid. Everything must be removed from the bag, that it may be wiped out once a week with a bichloride towel, a fresh sterile towel placed in the bottom, and the instruments returned.

The contents of the surgeon's bag should consist of the following:

1st. An aspirator.

2d. A six-ounce, hard-rubber-mounted, glass syringe.

3d. A four-quart fountain syringe.

4th. Any other instruments necessary for the case upon which you are to operate.

5th. Chloroform and ether, each $\bar{\text{z}}$ iv.

6th. Tablets of morphia, atropia, strychnia, and digitaline.

7th. Scrub-brushes, green soap and nail-scrape.

8th. Bandages, gauzes and cotton.

9th. Sterilized iodoform and iodoform colloidion.

10th. Chloroform or ether inhaler.

11th. Ligatures of silk, silkworm gut, catgut, kangaroo tendon and silver wire.

12th. A sponge bag made of thin rubber, full of gauze and cotton sponges ready for use.

13th. A bottle of rubber drainage tubes, catheters, etc., in five-per-cent carbolic solution.

14th. A bottle of needles, in absolute alcohol.

As above mentioned, the sponge bag is made of rubber, and must be large enough to carry sponges, gauzes, ligatures, needles, thread, silver wire, Thiersch powders and hand brushes.

INSTRUMENTS—STERILIZATION OF.

All instruments used in an operation must be boiled in a one-per-cent solution of cooking soda for five minutes. The proportion, according to Davidson and Shimmelbusch, is one tablespoonful of soda to a quart of water. The advantages of boiling in this solution are that the instruments do not rust, while at the same time the sterilization is rendered more thorough.

All instruments should be entirely of metal and perfectly plain, as any mark or letter upon them only serves for the lodgment of dirt.

Knives should never be boiled longer than five minutes, as long boiling will soon destroy their temper. The blades of knives should be wrapped with cotton or gauze before placing them in the sterilizer to protect their edges.

When the instruments are removed from the sterilizer, they must be placed in a one to two-per-cent solution of carbolic acid, either in glass, granite or porcelain dishes. The dishes containing the instruments must be placed within easy reach of the surgeon. There must also be placed near him a bowl containing bichloride solution, 1 : 5,000, for the hands, also another with sterile water for washing the sponges.

Sterilization of instruments and dressings by the use of formaldehyde gas—produced by boiling a forty-per-cent solution of formaldehyde in a specially-prepared apparatus, conducting the gas into the sterilizer—has recently been recommended by some of the members of the faculty of the Johns Hopkins University, Baltimore, although it has not been accepted by the profession at large.

A surgeon must not take his hands from a bichloride solution and introduce them directly into the abdominal cavity, as there is danger of exciting a peritonitis. In all operations of any magnitude the surgeon should be prepared to transfuse his patient in case of impending dan-

ger. Prior to beginning the operation two quarts of normal salt solution — 5ij of sodium chloride (common salt) to the quart of water — is dissolved in water, as hot as the hands can bear. This solution is put into a fountain syringe and suspended in easy reach of the patient, to be used if needed. A smooth, slightly curved point of a glass medicine dropper, attached to the tube of the syringe, answers admirably the purpose for which it is used. Before the glass nozzle is introduced into the vein, allow the water to flow to free the tube from air; otherwise, a sudden collapse of the patient might occur from the introduction of air into the vein, then to the heart. For particulars as to transfusion, see “TRANSFUSION.”

For the sterilization of instruments and dressings in private practice, I know of no better portable sterilizer than the one manufactured by the J. Elwood Lee Co., of Conshohocken, Penn. It is made of burnished copper, is 8 x 8 x 16 inches in size, and contains two wire net trays, one fitting into the other. The instruments are boiled in the bottom tray, while the dressings are steamed in the top. I have added to my sterilizer a nest of three copper pans, fitting snugly over its bottom, the whole fitting into the case in which the sterilizer is carried. It is heated best by gas; second, by the alcohol lamp accompany-

ing it ; or it may be set upon the stove, this answering the purpose well.

Both Shimmelbusch and Willy Meyer have devised portable sterilizers which are highly recommended, working upon the same principle as the one above mentioned.

Instruments—Care of.

After operation, each instrument must be thoroughly cleaned with hot water, perfectly dried with chamois skin or the fire, before it is returned to the bag or case. Knives must be kept sharp by the frequent use of the hone. Blunt instruments should be kept smooth by polishing with exceedingly fine emery paper and then with rouge and chamois skin. Instruments must be kept in bags or cases which are absolutely dry and as nearly dust-proof as possible. The most perfect instrument cases are constructed of iron and glass, the frame being of iron while the sides, doors and shelves are of glass.

Metal cases should be used for all instruments. The danger of sepsis is too great for any instrument to be carried in the old-time plush-lined case. (Gerster.)

LOTIONS AND IRRIGATING SOLUTIONS.

The best and by far the most useful of the germicides is the bichloride of mercury. It was introduced into surgical practice by Bergmann. Bichloride solutions must not be put into metal vessels; neither should instruments be put into this solution, as it turns them black. Sometimes water contains so much earthy salts that a precipitate is formed upon the addition of the bichloride. This is averted by dropping into the solution an amount of sodium chloride (common salt) equal to the quantity of bichloride used. For example, in a 1 : 1,000 solution bichloride, gr. xv.; sodium chloride. grs. xv.; aq. Oij.

Bichloride of mercury is used in varying strengths, according to the purpose for which it is used. For continuous irrigation in operations about the anus it is used in 1 : 5,000. For the irrigation of septic wounds and for washing the hands of the surgeon, and those of his assistants, it is used in 1 : 1,000 and 1 : 2,000, and for the irrigation of bone cavities, after necrotomy, it is used in 1 : 500.

The safest and easiest way of preparing these solutions is to be supplied with bichloride tablets, which must be kept in a dark bottle, each tablet

containing 7.7 grs. of bichloride of mercury. One of these tablets, dissolved in Oj. of aq. makes a solution 1 : 1,000.

This solution can be varied according to the strength desired. Dennis' Surgery (Gerster).

Carbolic Acid—Solution of.

Carbolic acid is used in one to two-per-cent solution for instruments during operation and for the irrigation of wounds. For the injection of cysts and joints, also for the cleansing of septic wounds, a five-per-cent solution is to be used. For the injection of a hydrocele, xv. or xx. gtts. of the pure acid is injected into the tunica vaginalis.

Lysol and Creolin.

Both lysol and creolin produce, when mixed with water, a turbid solution. They are used in one to two-per-cent solutions and are said to be three times as effective as carbolic acid. Creolin has a very disagreeable odor, though it is non-poisonous.

Thiersch Solution.

Thiersch powder consists of boric acid ʒiss, salicylic acid grs. xv. This, dissolved in hot water Oij, forms Thiersch solution. This is a weak solution, though somewhat antiseptic and non-poisonous.

Hydrogen Peroxide.

This is one of the best preparations we have for cleaning ill-smelling, suppurating wounds. It is used in almost any strength desired by the surgeon. Before injecting into wounds, a pinch of soda bicarb. should be added, relieving it of acidity, thus preventing smarting of the wounds.

POWDERS—ANTISEPTIC.

Iodoform is one of the best and most popular antiseptic powders known to surgery. It is used as a dusting powder in the dressing of almost every wound after operation. It is unsafe to use too freely in wounds of large extent, or in cavities, as there is danger of iodoform poisoning.

It is often used combined with alcohol, ether, or glycerine as an injection into tuberculous joints or cavities in five to twenty-per-cent solution. The odor of iodoform is partially destroyed by the admixture of burned powdered coffee.

Powdered Acetanilid.

Acetanilid is a good substitute for iodoform and is devoid of odor. Other antiseptic powders, which have been used with success, are bismuth subnitrate, zinc oxide, iodol, aristol, dermatol, and salol.

ROOM—PREPARATION OF FOR OPERATION.

When operating in private residences, select the least-used room in the house, removing all superfluous furniture the day before the operation, at the same time giving it a thorough dusting, and scrubbing with bichloride solution 1 : 500. This allows all dust to settle, consequently the chances for success are very materially enhanced. (Gerster.)

In the absence of an operating table, one may be improvised from boards of the proper length, supported on the ends of barrels, over which is spread an aseptic sheet.

At the time of operation, several gallons of boiling water must be in readiness, from which are prepared the solutions for the hands, instruments, sponges, ligatures, etc.

While the water is being boiled, the instruments, dressings, towels and gowns must be sterilized. In concluding this subject, I must strongly urge observance of the minutest details as regards asepsis, for upon this largely depends the success of any operation.

ANESTHETICS—ADMINISTRATION OF.

Anesthesia is both local and general. In the former, the sensibility of only a portion of the body is dormant, while in the latter, both sensibility and consciousness are absent. Local anesthesia is best obtained by the hypodermic injection of cocaine, the four-per-cent solution, grs. xviii to $\bar{3}j$, is the one most generally in use; but much weaker solutions may be employed, with equally good results.

The best mode of using cocaine is to inject a small area, and incise; the escape of blood carries out of the circulation all excess of cocaine. The needle should be very small, perfectly aseptic, and should not, at first, pass entirely through the skin. This manner of injecting and incising should be continued throughout the operation. When cocaine is used for operations upon the trunk, great care should be exercised, as there is danger of absorption and poisoning; but when used on the extremities, the part should be constricted with a rubber tube, thus preventing absorption. The tube must be gradually loosened, that any excess of the drug in the tissues may be slowly taken up. The needle should never be introduced into an inflamed area,

as it gives great pain; but some distance from the edge of the inflammation, and the needle made to gradually approach the field of operation, at the same time pressing upon the piston, causing the cocaine to escape into the tissues, as the needle enters. Cocaine anesthesia can well be employed for all minor operations, except in bone surgery, where it does not always prove satisfactory. Dr. John A. Wyeth, of New York city, is quite an expert in the use of this drug. I have had the pleasure of seeing him perform many operations under its anesthetic effects, with the most perfect satisfaction. He has employed cocaine for many years without a single death from poisoning. The above is the technique as practiced by this great surgeon.

A few years ago, Schliech, of Germany, introduced the infiltration method of local anesthesia by cocaine. He recommends three formulæ of different strengths, to be used according to the sensitiveness of the parts operated upon:

No. 1. STRONG.

℞ Acid Boric, grs. v.
Cocaine Hydrochlorate, grs. iij.
Morphine Sulphate, gr. $\frac{2}{5}$.
Sodium Chloride, grs. iij.
Aqua Destillata (sterile), ℥iiss.
M. Ft. sol.

No. 2. NORMAL.

℞ Acid Boric, grs. v.
Cocaine Hydrochlorate, grs. iss.
Morphia Sulphate, gr. $\frac{2}{5}$.
Sodium Chloride, grs. iiij.
Aqua Destillata (sterile), \mathfrak{z} iiiss.
M. Ft. sol.

No. 3. WEAK.

℞ Acid Boric, grs. v.
Cocaine Hydrochlorate, gr. $\frac{1}{6}$.
Morphia Sulphate, gr. $\frac{2}{5}$.
Sodium Chloride, grs iiij.
Aqua Destillata (sterile), \mathfrak{z} iiiss.
M. Ft. sol.

Of the No. 1 sol. as much as half an ounce may be used with safety; of the No. 2 sol. as much as \mathfrak{z} iiij may be employed with impunity; of the No. 3 sol. as much as Oj may be used, if necessary, without poisonous effects. Cocaine solutions must be kept in a cool place, otherwise they loose their anesthetic properties. Cocaine should be injected one-half minute before the tube is applied; and by the time the parts are constricted, or one minute after injection, the operation can generally be commenced. Under cocaine anesthesia, almost any operation known to surgery can be done. For very small operations, the skin may be frozen with chloride of ethyl or a spray of ether. The parts should be

constricted, if possible, before the spray is applied: when the field of operation shows a white zone, begin to cut. In young children ice, held against the parts to be operated upon for a few minutes, renders it insensible to pain.

Eucaine is used with the same results as cocaine, and in the same manner. Dr. Wyeth has succeeded in doing a resection of the larynx under morphine anesthesia, the operation lasting one hour and twenty minutes, his patient experiencing no pain. His mode of anesthetizing the parts with morphine is as follows: injecting at the beginning $\frac{1}{4}$ of a gr., and in twenty minutes $\frac{1}{8}$ of a gr., then in thirty minutes 1-16 of a gr., this being sufficient to anesthetize the parts for any ordinary operation.

Anesthesia—General.

General anesthesia is accomplished by the administration of chloroform, ether, or the A. C. E. mixture (alcohol 1 pt., chloroform 2 pts. and ether 3 pts.) It is useless to state that the above are all administered by inhalation.

On the day of the operation, the patient should be allowed only a small quantity of milk and whiskey, about four hours prior to anesthesia. No other food should be allowed, as it is liable to produce nausea and vomiting, at the same time subjecting the patient to strangulation and

death. All foreign bodies should be removed from the mouth before beginning anesthesia. It is advised by many eminent surgeons to give the patient a hypodermic injection of morphine and atropia, also a drink of whiskey before administering the anesthetic, though my friend, Dr. J. W. Guest, of this city, objects to this. Having administered anesthetics over 2,000 times, he has concluded that the condition of the patient is much better without it, claiming that the heart, respiration, and general condition is so masked that the effects of the anesthetic can not be kept in safe bounds. The anesthetizer must provide himself with a tongue forceps, screw gag, and sponge for wiping saliva from patient's mouth. Before beginning the anesthetic, he should rub the lobe of the patient's ear between the thumb and finger, noting the condition of the capillary circulation, and at various times throughout anesthesia. If it becomes poor, stop the anesthetic and give 1-30 grain of strychnia.

Chloroform—Administration of.

The remarks in regard to the inhalation of chloroform, apply to ether as well, with a deviation in the beginning. The Esmarch inhaler is the one par excellence. Chloroform, as well as all other anesthetics, must be of the purest, and should be bought in small bottles, as it deterior-

ates with keeping. The mouth, nose and cheeks, are greased with vaseline, the inhaler placed over the mouth and nose, and the chloroform added, a few drops at a time, until the patient has become accustomed to its fumes, which is about five minutes. It is continued in this manner throughout the anesthesia. Always inform your patients that they will experience a choking sensation, but not to be alarmed. When the patient is once under the anesthetic, never let him come out until the operation is completed. If nausea ensues turn the patient on the left side and press upon the pneumogastric nerve in the neck. This often controls all tendency to vomit.

If the respiration becomes labored, give 1-30 of a gr. of strychnia hypodermically, and repeat in twenty minutes; place the fingers beneath the ramus of the jaw, elevate the chin and open the glottis. If the pulse flags, give 1-100 of a gr. of nitro-glycerine and repeat in fifteen minutes. Dr. Guest regards the pupil as the best guide to the condition of the patient; if it responds to light the patient is safe, but if found dilated stop the anesthetic. The breathing can not be relied upon, though it is generally soft and regular when the patient is doing well.

In ether anesthesia, begin by placing the cone containing $\mathfrak{z}\text{j}$ of ether over the mouth and nose,

pushing the anesthesia from the start (thus forming less mucus in the throat), until the patient is well under; then give constantly, but only in sufficient quantity to keep the patient well anesthetized.

Dr. Guest's ideal method of administering an anesthetic is to begin with chloroform, and when the patient is well under its influence substituting ether for the remainder of the anesthesia. It is a conceded fact that ether is a safer anesthetic than chloroform, but the profession remains undecided as to whether it affects the kidneys more than does chloroform.

In patients who suffer with heart disease the limit of chloroform anesthesia should not exceed thirty minutes.

When respiration ceases during anesthesia, artificial respiration by Sylvester's method should be persisted in for thirty minutes, unless the patient is resuscitated before. The head should always be lowered. Sudden dilatation of the sphincter ani often causes the patient to gasp. The patient should be allowed to waken of his own accord.

Near the close of operations shock often occurs, attributed by many to the anesthetic, which is erroneous. If at this time the temperature falls two or three degrees, and is accompanied by shock, the patient is very apt to die.

Shock can be prevented by administering $\mathfrak{z}\mathfrak{j}$ of whiskey and $\mathfrak{z}\mathfrak{v}\mathfrak{i}\mathfrak{i}\mathfrak{j}$ of hot milk eight hours prior to the operation, and repeating it in four hours. This affords a good pulse and renders the patient susceptible to the anesthetic. The effects often last for forty-eight hours, thus preventing secondary shock. (Dennis' Surgery.) As above stated, morphine and atropia administered before an anesthetic protects the heart and respiration and aids the anesthesia.

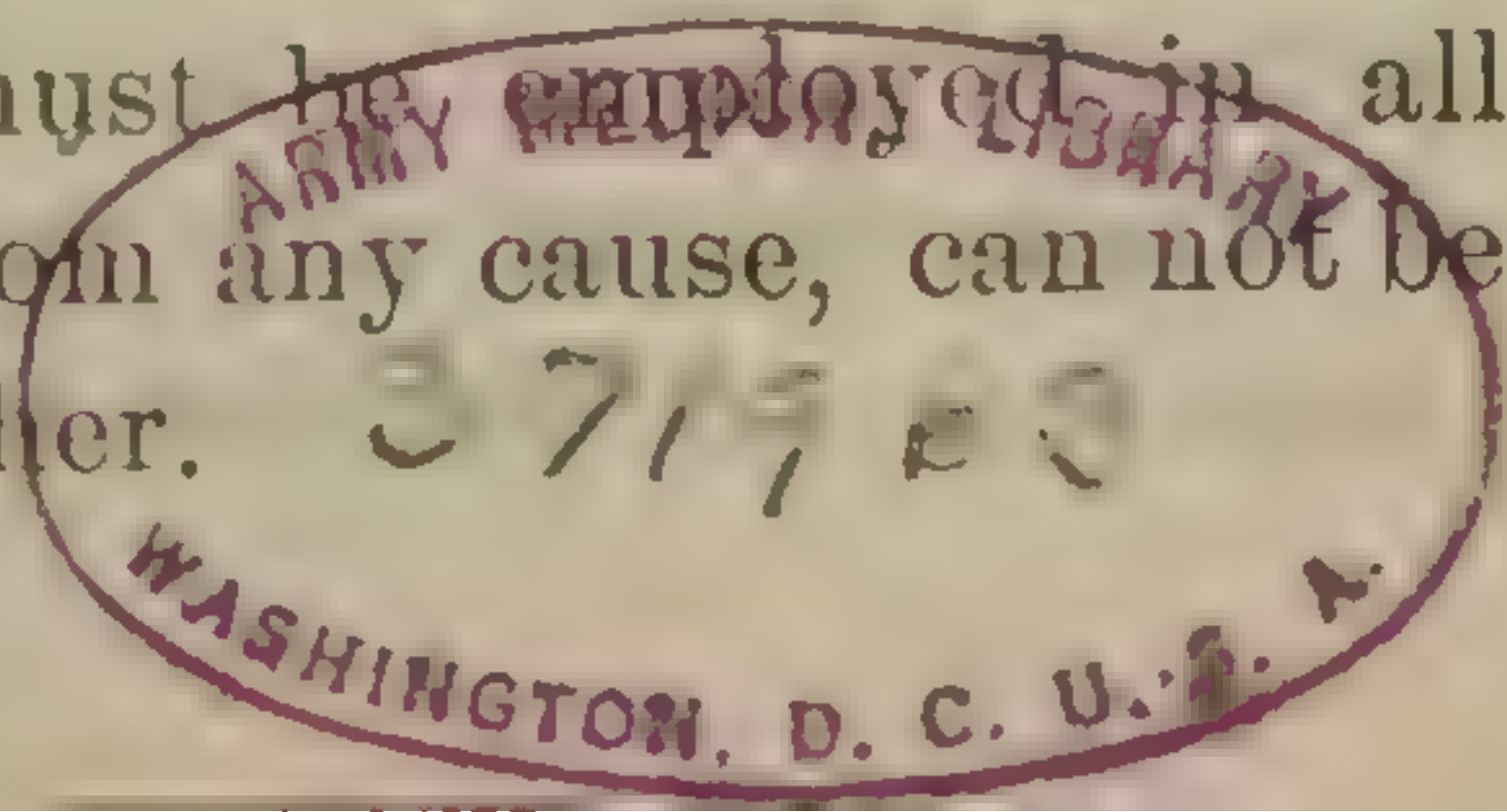
Should syncope occur, with sighing respiration and feeble pulse, lower the head, apply ammonia to the nostrils and give brandy continuously, by the mouth, rectum and hypodermically, at the same time applying heat to the body.

Collapse is ushered in by cold clammy sweats, irregular feeble pulse and low temperature, with panting respiration. Stimulants and heat are recommended.

AFTER TREATMENT OF WOUNDS.

First.—Never irrigate a wound when it can be avoided, as it only serves to irritate the tissues, dissolves thrombi, and stimulates capillary bleeding.

Second.—Drainage must be employed in all wounds whose walls, from any cause, can not be perfectly brought together.



Third.—Do not tear and bruise the surface of wounds, but make a clean, free incision, and do not stretch the wound.

Fourth.—Procure perfect contact of the tissues of the wound, with absolute rest. This is accomplished by the aid of sutures, dressings and position.

Fifth.—The circulation to the parts must not be interfered with, either by tight bandages or position.

Sixth.—Never disturb a dressing until a wound is healed, unless urgent indications arise. Fever of 103° often occurs in aseptic cases. This is aseptic fever, due to an elimination of fibrin ferment furnished by the wound. Two-thirds of the aseptic cases are accompanied by fever. (Volkman.) Dressing should not be changed because of small amount of bleeding and serous oozing.

Seventh.—Non-absorbable sutures and drainage tubes are foreign bodies, and should be removed when they have performed their functions. All oozing of blood and serum has generally ceased at the end of seventy-two hours; consequently the sutures and tubes may be removed on the fourth day. Unless indications demand the re-introduction of the drainage tube, it should be left out.

When tissues are invaded which are very vascular, and in which capillary oozing is persis-

tent, the hemorrhage must be controlled by packing with iodoform gauze. If a large vein is injured and can not be ligated—such as the intracranial sinuses—packing is the only remedy. Wounds which have been packed for capillary oozing, may have the packing withdrawn at the end of forty-eight hours, as they will then be found dry, and can be treated as a fresh wound. They generally heal by primary adhesion.

When packing is resorted to for injury to a vein, it should not be removed under a week or ten days; by this time the packing will have become loosened and comes away easily.

All wounds, after the removal of suppurating lymphatic glands and tuberculous joints, should be packed with iodoform gauze. This assists capillary drainage, by which all remaining infectious material is carried away.

By the aid of iodoform tampons, severe hemorrhage can be controlled without compromising our chance for primary union. Often wounds of doubtful asepticity can be rescued from suppuration. (Gerster—Dennis' Surgery.)

Accidental Wounds—Management of.

“The surgeon should never be so unsurgical as to act with haste, and under the excitement of the moment, introduce his dirty finger or probe into a wound. This is liable to carry sepsis to

the deeper structures. Ordinary hemorrhage can be controlled by the application of a dressing, applied with a moderate amount of pressure. If a large vessel is wounded, hemorrhage is controlled by proximal and distal compression: applied by placing a cord around the limb, passing a stick through it and twisting tightly enough to control the bleeding. This procedure is known as the Spanish windlass. This will suffice until the patient can be transferred to his home or the hospital. Should a fracture be present the application of a splint must be made. In wounds of the large vessels of the neck or groin, requiring immediate pressure, the fingers may be introduced into the wound to check hemorrhage, but under no other circumstances should this be done.' (Gerster, Dennis' Surgery.)

Washing or bathing wounds with water or styptics is useless, and should not be resorted to; but simply wipe away blood and dirt with a clean cotton cloth, and bind the wound in the same until more judicious dressings can be procured.

As soon as the patient has been taken to his home, or to the hospital, he should be treated in a perfectly aseptic manner.

LIGATION OF ARTERIES.

Having mentioned some of the prerequisites necessary to good surgery in the preceding pages, I will now enter upon the technique of operative work, beginning with the ligation of arteries. The instruments required are the scalpel, aneurism needle, thumb forceps, grooved director, and retractors. Catgut ligatures, being readily absorbed, are to be preferred. Extend the limb and determine the exact location of the artery, by its pulsation and anatomical relations. The skin is steadied by the thumb and index finger of the left hand, and an incision made directly over the artery of sufficient length to expose it; this being governed by each individual case. The fascia is picked up over the artery with the thumb forceps, and a transverse opening made with the scalpel, through which a director is passed and the tissues divided. When it is possible, the muscles must be separated, and not cut through, to expose the artery.

When the artery is reached, its sheath is pinched up with the thumb forceps and opened with the scalpel, through which opening is introduced the point of the needle armed with the ligature, which is passed beneath and around the artery—always away from the accompanying

vein. The ligature is now withdrawn from the eye of the needle, with the thumb forceps, and the needle removed. The ligature is tied with a reef knot, after satisfying yourself that the artery is included ; this is done by loosening the Esmarch bandage, and, with the tip of the finger on the artery, seeing if it pulsates ; if so, the ligature is tied. The ligature must be tied only tightly enough to cut off circulation, and not, as was formerly taught, so tightly as to destroy the inner coats of the vessels. Arteries whose circulation is cut off from the pressure of the Esmarch bandage, present a flat, grooved appearance, and are in this way distinguished from tendons and nerves. In ligaturing an artery, as in all other operations, every detail of aseptic surgery must be adhered to. The limb is then elevated, the blood milked out, and an Esmarch bandage uniformly applied, beginning at the toes or fingers, and extending up the limb to a short distance above the point of operation, where it is securely fastened by drawing the end of the bandage beneath the last two or three turns.

The bandage is then removed from the limb (with the exception of the few turns forming the constriction above the point of operation), beginning at the toes, or fingers.

Radial Artery—Ligation of (Lower Third).

An incision one inch and a half long is made in the depression between the tendons of the supinator longus and carpi radialis muscles ; at this point the artery is very superficial. After cutting through the skin, the tissues are picked up with two pairs of thumb forceps ; then with the scalpel are divided between them. This is known as the areation of tissues, and is practiced in all forms of dissection. If the artery is of large size, its sheath is opened after the manner described, and an aneurism needle, armed with a ligature, is passed ; from whose eye the ligature is removed with thumb forceps and the needle withdrawn. When the ligature is in place, it is tied deeply in the wound, pressing the ligature well into place with the tips of the fingers or thumbs. This must be done in such a manner that it will not raise the artery from its bed, or in any way tend to injure it. This technique is applicable in all ligations, and will receive no further comment. The wound is closed, and dressed antiseptically.

Radial Artery—Ligation of (Upper Third).

A line drawn from the middle of the elbow-joint in front to the styloid process of the radius, marks the course of the artery. Make an in-

cision three inches in length along the inner border of the supinator longus muscle, and dissect down its inner side to the artery, which lies between the supinator longus on its outside and the pronator radii teres on the inner side. The radial nerve is to the outside of the artery, while the venæ comites accompany it, one on each side. The artery is much deeper here than in the lower third. The ligature is carried around the artery and tied in the usual manner. Care is taken that neither the radial nerve nor either of the venæ comites are included in the ligature.

Ulnar Artery—Ligation of (Lower Third).

Make an incision two inches long to the outer side of the tense tendon of the flexor carpi ulnaris muscle, beginning the incision one inch above the pisiform bone. The artery is very superficial at this point ; expose vessel, pass ligature and tie.

Brachial Artery—Ligation of at Bend of Elbow.

Make an incision three inches in length, over the bend of the elbow, beginning between the median basilic vein and the tendon of the biceps muscle, and carry it up over the brachial artery ; retract the edges of the wound and pass the ligature from the inner side, avoiding the median nerve lying to the inner side of the artery.

Brachial Artery—Ligation of at Middle of Arm.

A line drawn from the junction of the middle and anterior thirds of the axillary space to the elbow joint in front, marks the line of the brachial artery. The point of election is in the middle of the arm; consequently, an incision two inches long is made parallel with and along the inner border of the biceps muscle. At this point the median nerve lies on top of the artery, and resembles a white, fibrous cord. The ligature must be passed from the inner to the outer side, exercising great care in avoiding the median nerve and *venæ comites*.

Axillary Artery—Ligation of.

Draw the arm well up by the side of the head, that the skin may be made tense over the axillary space, and with the fingers locate the head of the humerus and make an incision over it three inches in length, at the junction of the middle and anterior thirds of the axillary space. In the dissection it is found that the axillary vein is to the inner side of the artery; it should be drawn carefully aside. The ligature is passed from within outward, great care being exercised not to include either of the various branches of the axillary plexus, or the median nerve, which lies in front of the artery.

Subclavian Artery—Ligation of.

Place a cushion under the patient's shoulders, turning the face to the opposite side. Make an incision three inches long, extending from the outer margin of the clavicular attachment of the sternocleido-mastoid muscle, along the anterior-superior border of the clavicle. Dissect above and behind the clavicle, pass the finger into the wound and feel for the tubercle upon the first rib. The artery lies just to its outer side. The internal jugular vein lies in the anterior portion of the wound and must be drawn to the inner side. Great care is taken not to wound either the phrenic nerve, which crosses the front of the scalenus anticus muscle, or the lymphatic duct. The ligature is passed from before backward, taking care not to puncture the pleura.

Innominate Artery—Ligation of.

“Place a cushion beneath the patient's shoulders, allowing the head to fall backward. The right arm and shoulder are drawn forcibly downward, chin elevated, and face turned to left side. Make an incision three inches in length along the clavicle, beginning at the center of the sternoclavicular notch. A second incision, beginning at the inner border of the mastoideus muscle, two inches and a half above the clavicle, is to

unite with the first incision at the middle of the interclavicular notch. Dissect the flap upward, until the sterno-mastoid muscle is exposed. The sternal and two-thirds of the clavicular origins should be divided. Underneath its clavicular portion is the junction of the subclavian and jugular veins. The anterior jugular vein is just beneath the muscle, and must be ligated and divided between two ligatures. Now, dissecting with the handle of the scalpel, the sterno-hyoid and the sterno-thyroid muscles will be reached, and must be carefully divided upon the director, which shows the right carotid near the center of the wound ; following it down to the innominate, the ligature is passed from right to left behind the artery, care being taken not to wound the vena innominata and pneumogastric nerve, or puncture the pleura, in which the artery is partially imbedded. Where the aorta is situated low in the thorax, it may be necessary to remove the sternal end of the clavicle along with a segment of the sternum. This is a very delicate operation, and should be done with scrupulous care.” (Wyeth.)

Anterior Tibial Artery—Ligation of.

The anterior tibial artery lies in the first inter-muscular space to the outer side of the crest of the tibia throughout its entire course. A line,

drawn from a point midway between the head of the tibia and fibula to a point midway between the malleoli in front of the ankle joint, marks the course of the artery.

Dorsalis Pedis Artery—Ligation of.

Make an incision, one inch long, and one-fourth of an inch to the outer side of the tense tendon of the extensor proprius pollicis muscle, and over the tarsus. The tendon is made tense by extension of the great toe. The artery and veins are on a little deeper plane than the tendons, although at this point the artery is superficial and easily found.

Anterior Tibial Artery—Ligation of at Junction of the Middle and Lower Third.

Make an incision, two inches in length, at the junction of the middle and lower third of the leg, three-fourths of an inch to the outer side of the crest of the tibia, opening into the first intermuscular septum, with the extensor proprius pollicis on the outside, and the extensor communis digitorum on the inside. These are easily separated with the blunt end of the handle of the scalpel, exposing the artery. The ligature is passed, avoiding the nerve, to its outer side, and tied.

Anterior Tibial Artery—Ligation of at Junction of the Middle and Upper Third.

Make an incision, three inches long, one inch to the outer side of the crest of the tibia, over the first inter-muscular septum, dissect down between the tibialis anticus on the inner side, and the extensor proprius pollicis on the outside. Separate the artery well from the venæ comites and the anterior tibial nerve, which lie to its outer side. At this point the artery is generally one and one-half inches deep. To relax the muscles flex the foot upon the leg, pass the ligature and tie.

Posterior Tibial Artery—Ligation of in the Lower Third.

Make an incision one inch long, just anterior to a point midway between the internal malleolus and the edge of the heel. The artery is very superficial and easily found, with the posterior tibial nerve and tendon of the flexor longus pollicis behind and the flexor longus digitorum in front.

Posterior Tibial Artery—Ligation in the Upper Third.

Make an incision, three inches in length and half an inch behind the inner and posterior border of the tibia down to muscle, and separate the

gastrocnemius from the soleus muscle, and cut through the soleus. The artery is seen just beneath, lying on the tibialis posticus, with its venæ comites on either side. Let assistant retract edges of wound, while the ligature is passed and tied. The vessel is one and one-half inches deep at this point.

Popliteal Artery—Ligation of.

Place the patient upon his abdomen, with the popliteal space looking upward. Make an incision four inches long, beginning two inches above and to inner side of the knee joint, and extending downward and outward. The incision should not extend very much below the bend of the knee. The only difficulty in finding the artery is the failure to remove enough fat to expose it, as it is deeply imbedded. Great care should be taken not to ligate the internal popliteal nerve, as it lies on the artery. The popliteal nerve and vein should be drawn aside, while the ligation is being done.

Femoral Artery—Ligation of in Hunter's Canal.

The course of the femoral artery corresponds to a line drawn from the anterior-superior spinous process of the ilium, across the front of the thigh, to the middle of the popliteal space behind the knee joint. The leg is flexed upon the

thigh, while it in turn is flexed upon the abdomen, with the heel placed against the perineum, thus permitting the patient's leg to assume the tailor's position, rendering the adductor longus muscle very tense. Make an incision, three inches long, at the junction of the middle and lower thirds of the thigh, over the tense adductor longus muscle ; but instead of coming down upon this muscle, we come upon the sartorius, whose fibers run obliquely downward and inward, this muscle being a guide to the artery. Simply dissect down to and under its inner margin to the artery, where it is easily found. In Hunter's canal the femoral vein lies to the outside of and in close proximity to the artery; still more externally is to be found the long, saphenous nerve. The ligature is passed from without inward, thus preventing injury to the vein.

Femoral Artery — Ligation of in Scarpa's Triangle.

Make an incision beginning at a point four and one-half inches below Poupart's ligament, extending for three inches down the anterior aspect of the thigh, parallel to the inner margin of the sartorius muscle. In Scarpa's triangle the artery is very superficial, and to its inner side lies the femoral vein, and to its outer side the anterior crural nerve. The artery and vein

are included in a strong fibrous sheath, which must be opened before the ligature is passed, from within outward, thus preventing injury to the femoral vein. It is in these ligations that the Balance and Edmunds knot is used advantageously.

Profunda Femoris Artery—Ligation of.

Make an incision over the femoral artery, beginning at Poupart's ligament and extending down the front of the thigh for three inches; dissect out the artery and follow down its outer side, until the profunda is reached. Pass the ligature from within outward one inch from its origin and tie. The branches of the anterior crural nerve must not be included in the ligature.

Common Iliac Artery—Ligation of.

Turn the patient slightly on his side and partially flex the thigh upon the body, allowing the bowels to gravitate to the opposite side of the pelvis and out of the way of the operation. Make an incision six inches in length, extending from the middle of Poupart's ligament upwards and parallel to the external border of the rectus muscle. Cut through the fascia and muscles, exposing the peritoneum. Lay the knife aside, and with the fingers bluntly dissect in behind the peritoneum until the psoas muscle is reached.

Pack the intestines out of the way with gauze, and expose the artery which lies across the anterior surface of the psoas muscle. In passing the ligature, care should be taken not to wound the common iliac vein or to include the ureter, as it crosses the external iliac artery just below its origin. Both the internal and external iliacs may be ligated through this incision. If the two common iliacs are to be ligated, a median incision is to be preferred.

Abdominal Aorta—Ligation of.

Make an incision six inches long, beginning at a point three inches above the umbilicus and ending three inches below. The incision must curve around the navel. Divide all of the tissues down to the peritoneum, and check the bleeding before opening the peritoneal cavity. The transverse colon is drawn up out of the way, and the small intestines withdrawn and wrapped in a soft, warm piece of sterile gauze, which should be thick enough to keep the bowels warm and moist. With the finger-nail the posterior peritoneum is scratched through, and the aorta is exposed, around which a piece of large catgut ligature is passed from right to left. The ligature should be applied one inch above the bifurcation of the aorta. The bowels are returned and the abdomen closed in the usual way.

Gluteal Artery Ligation of.

Make an incision five inches in length, extending from the spine of the last lumbar vertebra to the trochanter major. At the center of this line the artery emerges. Separate the fibers of the gluteus maximus, with the handle of the scalpel, and draw the gluteus medius forward, beneath whose fibers is found the groove between the gluteus minimus and pyriformis muscles. Follow the groove upward to the bony edge of the notch, where the artery and veins are found. Pass the ligature and tie. Close the wound as usual.

Sciatic Artery—Ligation of (Wyeth).

Make an incision five inches in length, extending from the spine of the sacrum to the trochanter major; bluntly separate the fibers of the gluteus maximus, down to the lower border of the pyriformis muscle. At this point the great sciatic nerve is seen and in front of it the small sciatic nerve and artery. Anterior to the spine of the ischium is the internal pudic artery. The sciatic artery can be tied opposite the outer border of the tuber ischii.

Internal Pudic Artery—Ligation of.

Place the patient in the dorsal position, with the thigh flexed and abducted. Make an incision

two inches long in a line with the pubis and tuberosity of the ischium. The artery is found to the inner margin of the ramus of the pubis. Pass the ligature and tie.

Intercostal Artery—Ligation of.

Make an incision along the lower border of the rib, and cut through the superficial muscles, exposing the artery, which lies in a little groove just under the lower border of the rib. Pass a catgut ligature and tie. If this can not be done, pass the ligature completely around the rib (being careful not to puncture the pleura) and tie. Occasionally it may be necessary to remove a portion of the rib before the artery can be secured.

Internal Mammary Artery—Ligation of.

This artery is often ligated in cases of penetrating wounds of the chest. An oblique incision, one and a half inches in length, is made in the third intercostal space from without downward and inward to the sternum. The incision is carried through the skin, fascia and muscles, beneath which, and close to the inside of the ribs, the artery, accompanied by its venæ comites, is found lying on the triangularis sterni muscle, which separates it from the pleura. Great care is taken, in passing the ligature, not to puncture the pleura, or include the venæ

comites in the ligature. This is a very simple and easy operation.

Vertebral Artery—Ligation of.

This ligation has been recommended for epilepsy and tumors of the pons varolii. Make an incision three inches in length to the inner side of and parallel with the sternocleido-mastoid muscle, the middle of which corresponds to a point one inch below the thyroid cartilage. Dissection is made to expose the vertebral column, when the finger is introduced into the wound, and Chassaignac's tubercle is felt for, on the transverse process of the sixth cervical vertebra, through which the artery passes. The artery is exposed by passing through the foramen of the tubercle the thin blade of a rongeur forceps and biting it away; the ligature is then passed and tied.

Common Carotid Artery—Ligation of.

A cushion is placed under the patient's shoulders, and his head drawn backward, and the face turned to the opposite side from the one on which the operation is to be done. A line drawn from the tragus of the ear to the sternoclavicular articulation, marks the course of the common and internal carotid arteries. The artery generally bifurcates on a line with the

thyroid cartilage. The point of election for its ligation is one inch below its bifurcation, at the upper border of the anterior belly of the omohyoid muscle.

Make an incision three inches in length to the inner border of and parallel to the sternocleidomastoid muscle, the middle of which corresponds to a point one inch below the thyroid cartilage. The dissection is carried down to the tissue covering the spinal column, upon which the artery lies. Just below the artery lies the deep jugular vein and pneumogastric nerve. The sheath of the artery is opened on its inner side, and the artery well exposed, and ligature passed from without inward, taking great care not to wound the jugular vein or include the pneumogastric nerve in the ligature. Slight pressure on the vein above, as the ligature is being passed, lessens the danger of puncturing it.

If the jugular vein is wounded, press the finger over the wound to check hemorrhage and prevent the entrance of air into the circulation. If the wound is small, seize the puncture with artery forceps and apply a lateral ligature. If the wound is a large one, throw a ligature around, both above and below the wound, including sternocleidomastoid muscle, pneumogastric nerve and jugular vein. Tie the two ligatures tightly enough to control the hemor-

rhage, then ligate the vein both above and below the puncture.

Through this incision five operations can be done: Ligation of the common carotid artery; ligation of the inferior thyroid artery; ligation of the superior thyroid; ligation of the vertebral artery and external œsophagotomy.

Internal Carotid Artery—Ligation of.

The internal carotid artery is a continuation of the common carotid, but becomes tortuous on nearing the carotid canal.

Place the patient in the same position as for operation upon the common trunk, and make an incision three inches long, with its middle three-fourths of an inch above the superior border of the thyroid cartilage. It will be absolutely necessary, in most cases, to ligate and divide some of the veins encountered during this dissection before the artery can be tied. The ligature should be passed from the outside, avoiding the jugular vein, pneumogastric nerve, the external carotid artery, and the ascending pharyngeal. All of these troubles may be averted by keeping the point of the needle close to the artery while passing the ligature.

External Carotid Artery—Ligation of.

The position of the patient for this ligation is the same as for the internal. Make an incision three inches long, beginning at the lower border of the mastoid process and extending down along the inner margin of the sternocleidomastoid muscle. By careful dissection the artery is exposed and ligated between the facial and auricular arteries. The artery may also be ligated between the superior thyroid and the lingual, one-fourth of an inch above the bifurcation of the common carotid. This can be done through the incision made for ligation of the internal carotid, though the external carotid lies a little in front of the internal. If the artery is tied very close to one of its branches, the latter should be ligated. The external carotid is often excised for the relief of sarcoma of the superior maxilla. It is dissected out and its eight branches tied; then it is ligated above and below, and the intervening portion excised. This is a very difficult operation, and should be done with great care.

Superior Thyroid Artery—Ligation of.

Place the patient in the same position as for operation on the common carotid; make an incision one-fourth of an inch in front of, and parallel to, the inner margin of the sternocleido-

mastoid muscle, the middle of the incision corresponding to the thyroid notch. Just under the skin will be seen a number of veins, which are tied and divided, the tissues separated, and the artery exposed; the ligature is passed with ease, and tied.

Lingual Artery—Ligation of.

Place a cushion beneath the patient's shoulders, turn the face to the opposite side, and make a semicircular incision, the base of which corresponds to the middle of the inferior maxilla. Dissect the flap loose, and draw it up over the cheek, exposing the sublingual gland, which is also dissected loose and drawn up, laying bare the two tendons of the digastric muscle; these, aided by the hypoglossal nerve, which passes across them, form the digastric triangle. In this triangle lies the hyoglossus muscle, beneath which is found the lingual artery. This ligation is regarded as one of the most difficult, but is rendered very easy by adherence to this technique. The ligation of this artery is done for the arrest of hemorrhage, and prior to the removal of the tongue in cases of malignancy.

Facial Artery—Ligation of.

Make an incision one inch in length along the lower and under border of the inferior maxilla,

with its middle corresponding to the anterior border of the masseter muscle. At this point the artery is easily found and ligated.

Occipital Artery—Ligation of.

Make an incision two inches long, a little over half an inch behind the mastoid process. Extending upward and backward, the aponeurosis of the mastoid muscle is divided and exposed, ligature passed and tied.

Ligation of Posterior Auricular Artery.

This artery is given off from the external carotid, about one and three-fourths inches above the thyroid notch. For lesions of this vessel, the external carotid should be ligated above the posterior belly of the digastric muscle.

Ligation of the Temporal and Internal Maxillary Arteries.

The temporal artery is ligated through an incision one inch long, made in front of the tragus of the ear, where it crosses the zygoma. If this vessel or the internal maxillary is wounded in the substance of the parotid gland, the external carotid should be ligated at the posterior belly of the digastric muscle.

Ligation of Internal Jugular Veins.

This is done through the same incision made for ligation of the common carotid artery. In operations of the neck, where it becomes necessary to divide any of the veins, they should be tied with two ligatures of catgut and the veins divided between them.

AMPUTATIONS.

In making amputations no more tissue should be sacrificed than is absolutely necessary for the removal of all of the diseased area. After the patient has been anesthetized and placed upon the operating table, the limb is elevated, the blood milked out, and an Esmarch bandage applied, from the fingers or toes, as the case may be. For a more thorough understanding of the application of the Esmarch bandage, see **LIGATION OF ARTERIES.**

Fingers—Amputation of (Lisfranc).

Make an incision across the dorsal aspect of the finger (just below the joint where the amputation is to be made) to the bone and disarticulate. When the knife has passed through the joint, it is turned down the palmar side of, and close

to, the bone, cutting a flap to the joint below, where the flap is cut squarely off, thus forming a palmar flap of sufficient length to cover the end of the stump. The vessels are tied, the flap turned over the end of the stump and sewed.

Dress with iodoform and dry sterile gauze. This operation may also be done by passing the blade of the knife through the palmar surface of the finger, close to the bone, and with a sawing motion transfix a flap to the joint below. Cut the flap squarely off, and disarticulate at the joint where you wish to amputate. Secure the vessels, turn the flap over the end of the stump and sew.

Though this operation is classical, it has fallen into disuse, and instead the finger is cut smoothly off without flaps, and allowed to heal by granulation. This requires longer time, but the length of the finger is preserved.

Carpo-Metacarpal Bone — Amputation of (Scoutetten).

Make an incision from the carpo-metacarpal joint, hard down upon the bone, to a point below the web of the finger, and make a circular incision around the finger at the web. Dissect the metacarpal bone out, keeping close to it to prevent wounding the vessels. The metacarpal bone is then seized with a bone forceps and cut off just

below its head. Check all hemorrhage, and with a catgut suture sew the muscles closely together; then pass a silkworm gut ligature around the two adjacent metacarpal bones, and tie them firmly together, leaving the ends of the ligature long, that it may be removed. The skin is closed with catgut sutures, dusted with iodoform, and dry sterile gauze dressing applied. After healing has taken place, remove the silkworm gut suture and have patient wear either a rubber band or tight-fitting glove for several months, to preserve the contour of the hand.

Thumb—Amputation of.

A flap amputation of the thumb should never be done except in cases of malignancy.

Make an incision from the base of the metacarpal bone down over the thumb to its web; here a circular incision is carried around the thumb, after which the metacarpal bone is dissected out for three-fourths of its length, broken back and twisted out. This precaution is absolutely necessary, that the synovial cavity of the wrist joint may not be opened, or the superficialis volæ artery wounded, which lies over the joint. Close wound with buried and superficial catgut sutures, and dress with iodoform, gauze and bandage.

Hand—Amputation of (Esmarch).

Make an incision beginning at the pisiform bone on the ulnar end of the palm, and extending across the palm, allowing the middle of the M in the hand to represent the point at which the incision crosses the palm to the opposite side. Now make a similar, though somewhat shorter flap, on the back of the hand. Dissect flaps to the bone and well back, and disarticulate at the front of the wrist joint, check hemorrhage, trim off the tendons, close the wound with cat-gut sutures, dust with iodoform, and dress with sterile gauze, cotton and bandage.

Wrist Joint—Amputation of.

Make a vertical incision, beginning at the styloid process of the radius, extending down the side of the hand for two inches, then transversely across the palm to the opposite side, thence up to the ulnar side of the hand to the styloid process of the ulna. Dissect the flap up to the bone, and well back; make a very short dorsal flap, and disarticulate at the wrist joint. Check hemorrhage, turn flap over the end of the stump and sew.

Dress with iodoform, dry sterile gauze and bandage. The styloid processes may be cut off or left on, at the discretion of the surgeon.

Arms and Legs—Amputation of.

In all amputations of the arms and legs, the flaps should be equal in length to one-half the thickness of the limb—plus one inch. The best plan is to decide where the bone must be sawed, and mark the skin with ink or iodine. Then with a string measure the circumference of the limb; double the string three times; the remaining length of the doubled string is equal to one-half of the diameter of the limb. Now lay the string upon the limb, extending downward from the mark previously made with the iodine, and add one inch. This marks the point at which the circular incision must be made. Though the flaps, to the inexperienced, appear very long, they never fail to retract in due time, giving satisfactory results to both patient and surgeon.

A circular incision is made by the surgeon passing his hand under and behind the limb to be operated upon, and placing the knife as far over the limb, next to himself, as possible; and with one continuous sawing sweep, carrying the incision completely around the limb down to muscle. (This applies to all circular incisions.) The flaps are then dissected up, with every particle of the fascia, to the muscle; in all cases cutting toward the muscle (not digging up under the flap), and in this way avoid buttonholing the

flap. The flap is turned up like the cuff of a coat sleeve. Great care must be taken to dissect up all the fascia to muscle, as in it lie the blood vessels supplying nutrition to the skin. The flaps should be drawn up with the finger and thumb, as forceps bruise them and might cause sloughing. When the flaps are dissected well up, they are held by the assistant, and with a circular incision the muscles are divided close to the flaps and down to the bone.

Forearm—Amputation of.

Make a circular incision completely around the forearm to muscle; a vertical incision is then made from the point at which the bone is to be sawed, down each side of the forearm to the end of the flap; after which the flaps are dissected up with all the fascia to muscle. The muscles are then divided down to the bones, when a three-tailed retractor, made of sterile gauze, is applied, allowing the middle tail to pass between the radius and the ulna, while the other two encircle these bones; the flaps and muscles are well retracted by the assistant, while the surgeon cuts through the periosteum, and dissects up a flap with which to cover the end of the bone. The bones are then sawed through, high up against the flap, and both at the same time. The ends of the bones are smoothed off with a

rasp or bone forceps, and periosteal flap brought over the end of the bone, all bleeding checked, the nerves drawn down and cut off, flaps brought over end of bone and sewed, with both retention and coaptation sutures.

A small drain of rubber tissue or catgut is left in for twenty-four hours. The stump is dusted with iodoform, and a dry sterile dressing applied. Dressing is not changed for ten days, unless demanded by some unforeseen complication. At this time the retention sutures are removed.

Elbow-Joint—Amputation of.

Pass the knife through the tissues in front of, and as close to the elbow-joint as possible, and cut from within outward, transfixing a flap one-third the length of the forearm, and make a similar, though shorter, posterior flap. Retract the flaps and disarticulate the joint. Secure vessels, cut off the nerve, and close the wound with catgut sutures, leaving catgut in for drainage. Dress with iodoform, sterile gauze and bandage. The condyles of the humerus are not sawed off, this rendering it more liable to absorption in case of sepsis. Redress in ten days.

Arm—Amputation of.

Make a circular incision completely around the arm to muscle ; dissect up the flap and turn it

back like the cuff of a coat, as far as necessary, and cut the muscles to the bone at the base of the flap. Then, with a gauze retractor, the soft parts are well retracted and a periosteal flap made. The bone is sawed high up, and the edges smoothed with the rasp or bone forceps. The periosteal flap is then brought over the end of the bone. The vessels are ligated, and nerve drawn down and cut off ; the flap is then brought down and closed with both coaptation and retention sutures. A drain of rubber tissue is left in the wound for twenty-four hours. Dust the stump with iodoform and dress with sterile gauze, cotton and bandage. Redress in ten days and remove the retention sutures.

Shoulder-Joint—Amputation of (Esmarch).

In connection with the Esmarch bandage for the control of hemorrhage, Wyeth's hæmostatic pins may be used to good advantage in this operation. The anterior pin is passed through, and beneath the skin and superficial fascia on the front of the shoulder-joint for about three inches. The posterior pin is inserted posteriorly in a corresponding position. The arm is elevated, the blood milked out and a strong rubber tube applied very tightly around the joint above the pins, a sufficient number of times to completely control the circulation. An incision is

made from the tip of the acromion process of the scapula, down over the shoulder-joint to the bone, to a point below the lower border of the axilla. A circular incision is now carried around the arm to the bone at the lower border of the axilla. While the assistant holds the arm in an extended position, at right angles to the body, the surgeon dissects the head of the bone out with the scissors, directing the assistant to make extension on the arm, and at the same time twisting the bone on its long axis.

The blood vessels are ligated and the nerves drawn down and cut off; after which, the rubber tube is loosened, that any remaining vessels may be secured. Smooth the ends of the muscles, and close the wound with retention and coaptation sutures. Drainage of rubber tissue, or tube, is left in the wound for twenty-four hours. Dust the wound with iodoform and dress with sterile gauze, cotton, and bandage.

Leg—Amputation of.

All classical operations upon the foot, as well as on other parts of the body, have fallen into disrepute. I have rarely witnessed an operation unaccompanied by modifications. The tendency of modern surgery is to save tissue rather than to comply with the almost obsolete methods of Lisfranc, Pirogoff, Hey, and others. It is far

better for the surgeon to diagram his work before beginning the operation. I once heard the eminent Pean say that all surface work should be diagrammed, and I have often seen him do this before making his incision. In amputation of the legs, like the arms, the flaps should be equal in length to one half the diameter of the limb plus one inch. See AMPUTATION OF THE ARM, for rule for obtaining the length of the flap.

Toe-nail Ingrowing—Amputation of.

While this is not strictly an amputation, it is best described here, as is the operation for bun-ion, which will follow.

Introduce one blade of a sharp-pointed scissors under the toe-nail to be removed ; detach one-fifth of the nail and twist it out with a pair of forceps ; then, with a Volkman sharp spoon, curette away all of the diseased tissue, including the matrix of the portion of the nail removed. Dissect the tissue freely loose from the side of the bone, and allow the wound to be closed without tension. Pass the needle from the outside of the toe, through the flap, and return through the same flap to the outside of the toe ; cross the nail and introduce the needle through the inside flap from within, outward, then from without, inward, and tie, on top of the toe-nail. Dress with iodoform, cotton, and bandage.

Bunion—Operation for.

Elevate the limb, milk the blood out, and apply an Esmarch bandage. Make a semi-circular incision with apex above, over the metatarso-phalangeal articulation of the great toe. Dissect the flap loose, turn it down and expose the bone. Open the joint, and with bone forceps detach the head of the metatarsal bone. If the phalangeal bone is diseased, curette away the diseased portion, with a Volkman sharp spoon. Now close the wound with a continuous suture, and dress with a splint on the bottom of the foot, extending to the end of the great toe, thus holding it in line with the foot. The Esmarch bandage is now removed, allowing the cavity to immediately fill with blood; consequently the foot must be elevated for a few days. After two weeks remove the dressings, and begin passive motion. This operation affords permanent relief.

Toes—Amputation of.

The same general rules apply to amputation of the toes as those used in amputation of the fingers. When possible, the end of the stump should always be covered with a plantar flap. They are made in the same way as are those in the amputation of the fingers, and the after treatment and the dressings are the same.

Great Toe—Amputation of.

Begin an incision just behind the tarso-metatarsal joint, carrying it down along the metatarsal bone of the great toe to the metatarso-phalangeal joint, then curve around the side of the toe to the plantar surface of the foot. Reintroduce the knife and curve the incision around the inner side of the toe, to meet the first incision on the plantar aspect of the great toe.

Seizing the great toe with the left hand, the metatarsal bone is dissected out with the scissors (leaving the sessamoid bone undisturbed), and disarticulated at the tarso-metatarsal joint. Check all hemorrhage and close the wound with both buried and superficial catgut sutures.

Dress with iodoform, sterile gauze, cotton and bandage.

Fifth Metatarsal Bone—Amputation of.

Begin an incision just behind the tarso-metatarsal joint, and carry it down the outside of the foot, as in amputation of the great toe.

Single Metatarsal Bone—Amputation of

May be made according to the method for a similar operation upon the hand.

Metatarsal Bones—Amputation Through.

Make a curved incision on the dorsum of the foot, with convexity toward the toes, dividing all of the tissues to the bones and dissecting the flap up. Make a plantar incision around the commissure of the toes and dissect the flap up to the point at which the bones are to be divided. Cut the interosseous muscles, and retract them with a six-tailed gauze retractor, dividing the metatarsal bones with a fine-toothed saw.

Close the wound and dress with iodoform, sterile gauze, cotton and bandage.

Amputation of the Foot (Lisfranc).

Elevate the foot, milk the blood out and apply an Esmarch bandage. Make an incision from the base of the metatarsal bone on the outside of the foot, and extending to within one inch of the base of the toes; then carry the incision across the sole of the foot, one inch behind the base of the toes to the opposite side, and pass down the inside of the foot to the base of the metatarsal bone of the great toe. The dorsal flap is made by introducing the knife one inch in front of the base of the metatarsal bone of the great toe, and carrying it across the dorsum of the foot to the base of the incision on the opposite side of the foot, allowing the knife

to pass one and one-half inches behind the base of the toes. The dorsal flap is dissected back, and with scissors the tendons are cut short. The plantar flap is dissected loose from bone as far back as the tarso-metatarsal joint. The tendon of the peroneus longus muscle serves as a guide as to how far the plantar flap should be dissected back.

Retract the flaps and introduce the knife, beginning on the outside of the foot, through the tarso-metatarsal joint, disarticulating until the knife comes in contact with the second metatarsal bone. Then withdraw the knife and disarticulate the tarso-metatarsal joint on the inside of the foot. Now extend the foot and insert the point of the scalpel into the second tarso-metatarsal joint, severing the remaining fibers, which prevent liberation of the foot. Secure vessels, draw nerves down and excise, and close wound with catgut sutures. Dressing consists of iodoform, sterile gauze, cotton and bandage.

Hey's amputation of the foot is identical with Lisfranc's, with a single exception: the second metatarsal bone is sawed through, the base remaining intact.

Foot—Amputation of (Chopart).

With the Esmarch bandage in place, an incision is made from a point one inch behind the base of the fifth metatarsal bone, and carried along the outside of the foot to within one and one-half inches of the base of the toes, at which point the sole of the foot is crossed to the inner side, and the incision is extended to a point one inch behind the tuberosity of the scaphoid bone. The dorsal flap is made by passing the knife across the dorsum of the foot one and one-half inches behind the base of the toes. Dissect the flaps well back, and leave the tendons long, that they may be stitched together over the end of the stump, to prevent rolling forward of the ankle. Retract the flaps, and disarticulate behind the scaphoid and cuboid bones. Secure vessels, excise nerve, close wound, and dress with iodoform, sterile gauze, cotton and bandage.

Foot—Amputation of (Symes).

This amputation gives far better results than any other; less mortality, better stump, and safer operation. Elevate the limb, milk out the blood, and apply an Esmarch bandage. Begin an incision just behind the internal malleolus, and pass the knife slightly downward and forward, extending across the sole of the foot,

and up outer side to a point just above and behind the external malleolus. Introduce the point of the scalpel behind the internal malleolus, and curving over the ankle joint to a corresponding point on the outside of the foot. Dissect the anterior flap well back, cut the tendons short, and disarticulate at the ankle joint; after which, dissect the os calcis out, exercising great care not to buttonhole the flap, as this will cause it to slough. The tendo Achillis is divided; saw off the projecting malleoli, secure vessels, excise nerve, and close the wound. Dress with iodoform, cotton and bandage.

Leg—Amputation of at Middle and Lower Third.

Elevate the limb, and apply an Esmarch bandage. Make a circular incision around the leg, through the skin to muscle. A vertical incision is then made from the point at which the bone is to be sawed down to the end of the flap, on the anterior-lateral aspect of the leg and a second one on the posterior-lateral aspect of the leg. The flaps are well dissected, including all of the tissues, to muscle. Retract the flaps, and with a circular sweep of the knife cut the muscles to the bones; turn back the periosteum and apply a three-tailed gauze retractor, allowing the middle tail to pass between the tibia and fibula, while the remaining two encircle the bones, and

retract the soft parts well, and saw the bones close to base of flaps, permitting the saw to first cut through the fibula. The anterior crest of the tibia is sawed off to prevent its perforating the flap during the process of healing. The nutrient canal, in the end of the tibia, may be plugged with a peg made from a sterilized match. The edges of the bones are smoothed off with a sterilized file or the bone forceps. Secure the vessels, excise nerves, and close the wound with both retention and coaptation sutures. A drain of catgut may be left in for twenty-four hours. Dust the wound with iodoform, and apply a dry sterile dressing, cotton and bandage. As in the arm, if the patient is a child, the surgeon should not neglect to inform the parents that, while the flap is abundant, it may eventually retract over the end of the bone. This is due to excessive nutrition of the tibia, as it contains the largest nutrient artery in the body.

Knee-Joint—Amputation of (Stephen Smith).

This is the most popular amputation of the knee-joint known to surgery. After having elevated the limb, milked out the blood, and applied the Esmarch bandage, an incision is made one handsbreadth plus one inch below the knee-joint, entering the point of the knife on the crest of the tibia, and curving the incision

slightly downward and backward around the side of the leg to a point in the popliteal space slightly above the beginning of the incision. Reintroduce the knife on the crest of the tibia, and carry it around the opposite side of the leg in a similar manner, to meet its fellow in the popliteal space. The skin is split from the junction of the two incisions in the popliteal space to the bend of the knee-joint above. Dissect up the flaps to muscle, to the lower border of the patella; cut through the ligamentum patella and disarticulate the knee-joint. Ligate the vessels, excise the nerves, and close the wound with retention and coaptation sutures, placing the patella as well over the end of the stump as possible. Dress with iodoform, sterile gauze, cotton and bandage. A drain of catgut or rubber tube may be left in for thirty-six hours.

Thigh—Amputation of.

Elevate the limb, and cut both inner and outer hamstrings, allowing retraction of the muscles. If, in the application of the bandage, the wounds should bleed freely, have an assistant to place his thumbs in the wounds until it is in place. The patient is drawn down so the hips rest on the end of the table, the legs being supported by assistants. A circular incision is carried completely around the thigh to the

muscles; after which, the flap is dissected well back, including all of the tissues, down to the muscles. It must be dissected up an inch above the point to which it naturally retracts. Retract the flap, and cut the muscles to the bone, close up to the base of the flap, dissecting them loose far enough to allow them to cover the end of the bone. Turn back a periosteal flap and apply a gauze retractor, retracting the soft parts, and saw the bone high up. Secure the blood vessels, excise the nerves, and close the wound with retention and coaptation sutures, leaving a rubber tube in the wound for drainage. Dust the wound with iodoform, and dress with sterile gauze, cotton and bandage.

Hip-Joint—Amputation of (Wyeth).

“Place the hand flat upon the front of the thigh and lower part of the abdomen, with the fingers pointing toward the knee, and pass Wyeth's pins; the one on the outside of the thigh is inserted one inch below the anterior-superior spine of the ilium, and passed beneath the skin and superficial fascia for three inches. The other one is passed through the adductor longus muscle, close to the perineum, and emerges one inch in front of the tuberosity of the ischium. The points of the pins are protected by corks, to prevent their wounding the hands of the sur-

geon and those of his assistants. The limb is elevated at right angles to the body, the blood milked out, and an Esmarch bandage applied from the toes to the hip, unless contraindicated by disease or pus, which might, by firm pressure of the bandage, be compressed into the circulation, producing general sepsis. Under such conditions the bandage must be applied above the seat of the disease, and extend to the hip. With the Esmarch bandage well applied, a white rubber tube, three-fourths of an inch in diameter, is uniformly carried around the hip above the pins. It should not be applied with a jerking motion, and each layer of the tube must lie beside its fellow and not on top of it; as in this manner we secure a wide pressure, and the circulation is more perfectly controlled. Generally five or six turns of the tube are quite sufficient to control the circulation, and 'once more for safety.' '' (Wyeth.) If the surgeon prefers, a roller bandage may be placed on the femoral artery, over which the tube is applied, this serving as a compress on the vessel. If the Esmarch bandage has been employed, it is now removed. The knife is introduced below the tourniquet, and above the greater trochanter, to the bone, and carried down the outer side of the limb, exposing the bone for eight inches or more; then make a circular incision, four inches below

the perineum, to the muscles; dissect the flap up to the line of the trochanter minor, and at this point divide the muscles and other soft parts to the bone. In order to facilitate the search for the vessels, the soft parts are rapidly removed from the femur for several inches below. At this stage of the operation, the large vessels, veins as well as the arteries, should be tied with large-sized catgut. The bone is left intact, and the leg is used as a lever in dislodging the head of the bone.

Let the assistant hold the limb in an extended position, while you proceed to dissect the bone out with scissors. When the capsular ligament is exposed, it is divided by plunging a scalpel through it and cutting hard on the bone, then by abducting the thigh, air is permitted to enter the joint; at the same time the ligamentum teres is ruptured; consequently disarticulation is thus easily and rapidly effected.

“Properly conducted up to this point,” so says the distinguished founder of the New York Polyclinic, not a drop of blood has been lost, except that which was in the limb below the tourniquet, when it was applied. If the tourniquet is carefully and gradually loosened, each bleeding point may be determined, and the vessels ligated as required, until the tube is entirely removed. Should any difficulty be encountered

in the enucleation, the same precaution in securing all bleeding points, should be exercised in removing the tourniquet and completing the enucleation.

The wound is closed with the usual precautions of drainage, one good-sized rubber tube, extending from the acetabulum, to and out of, the most dependent portion of the wound, is left in, and the wound closed with retention and coaptation sutures of silkworm gut. The stump is freely dusted with iodoform, and a dry sterile dressing applied. To again quote the distinguished Wyeth: "When, by reason of the close proximity of a neoplasm or the destruction of the parts by accident or disease, this ideal method is not practicable, any modification may be practiced, preference being given to the incision that keeps furthest from the tumor, or gives it the healthiest flaps. When there is not sufficient material for perfect closure, it is even safer to err on the side of an unclosed wound, and trust to granulation or grafting for ultimate closing of the wound.

"Before concluding the consideration of this technique, I wish to emphasize a point of great importance. When by reason of severe hemorrhage before operation, or when from any pathological anæmia or condition of weakness, the operation should be rapidly completed, and the

small amount of blood that will be lost from capillary bleeding should be saved, sutures of silkworm gut must be rapidly introduced, the wound packed with hot sterile gauze, and the sutures temporarily tightened for snug compression of the wound surfaces. This at once controls all oozing, and can be removed in from twenty-four to forty-eight hours after reaction has taken place and the sutures finally secured."

Breast—Amputation of.

While in attendance at Macewen's clinics, in Glasgow, Scotland, I had the pleasure of witnessing this great surgeon in many of his operations, and among them were several amputations of the breast. He says, unless this operation is thoroughly done, it had best be left alone. It must be done in the early stages of the disease; otherwise, it is a waste of time and reputation. An elliptical incision is made, with its long arm extending down the anterior aspect of the axilla and arm, for six inches, and wide of the disease. The lower incision should be made first, and the blood-vessels clamped as they are cut. The skin and superficial fascia are dissected back, and the entire axilla, with its contents, exposed: also the outer end of the pectoralis major is uncovered. The flaps are retracted by an assistant, while the operator dissects the contents

of the axilla away, including glands and connective tissue, exposing the axillary vessels and nerves. Keeping them well in view, we dissect from them in every direction, removing the axillary, supra and infra-clavicular glands, along with every vestige of connective tissue to be found, great care being taken not to wound the axillary artery and vein. After having removed the axillary contents, the pectoralis major muscle is cut loose at its outer end from the humerus, excepting a few clavicular fibers, and along with it the pectoralis minor is dissected off, leaving the ribs perfectly nude.

If the disease is extensive, the consequence is a large wound, and in many cases the edges can not be approximated, though this is aided by dissecting the skin loose on both sides, and passing retention sutures two inches from the edges of the flaps, and loosely tying, until the coaptation sutures are in place, when the retention sutures are tied tightly. Sometimes a purse-string suture, carried around the wound and tied tightly, answers the purpose. Before the sutures are tied, a double rubber drainage tube is passed through the posterior and most dependent portion of the wound. A long dressing forceps is passed into the wound against its posterior wall, which is made to bulge, and with a scalpel the point of the forceps is cut down upon and the

drainage tube drawn through as the forceps is removed. The wound is dusted with iodoform, and a dry sterile dressing applied, which should be of an abundance of gauze, cotton and bandage. The bandage is carried completely around the body, binding the arm closely to the side. The forearm is flexed, and lies across the chest imbedded in cotton. The dressing is left on one week, after which light sterile dressings and rest complete the cure.

JOINTS—EXCISION OF.

I shall only speak, in this connection, of a few of the most important excisions, but the same general principle applies to all.

Elbow-Joint—Excision of (Langenbeck).

Flex the forearm upon the arm and make an incision six inches long on the posterior aspect of the elbow-joint to bone, allowing the olecranon process to occupy its middle. Retract the flaps, and with the mallet and chisel dissect the periosteum back, carrying with it a very thin shell of bone, though in a recent conversation with Dr. Macewen, of Glasgow, Scotland, he remarked that it was not at all necessary

that the shell of bone should be turned back with the periosteum. Great care should be taken not to detach the tendons of the triceps and brachialis anticus muscles, the last of which is attached to the styloid process of the ulna. The same care is also necessary not to injure the brachial artery and vein, or the ulnar nerve, which lies to the inner side of the arm, in the groove between the inner condyle and the olecranon process. When the dissection is completed, apply a gauze retractor and retract the soft parts well, removing enough bone to allow a space of two inches between their ends. The wound is closed in the usual manner, there being but little oozing. The dressing consists of a pair of double right-angle strap-iron splints, which are bound closely to the arm with plaster rollers, one above the joint, the other one below. The forearm is flexed at right angles upon the arm, and the two free ends of the splints are secured over the joint with a screw clamp. The wound is dressed with sterile gauze, cotton and bandage. After one week the clamp is loosened and the forearm extended, the clamp tightened and left for one-half week, when it is again flexed and left for one-fourth of a week. It is again extended in twenty-four hours. This procedure is kept up, dividing the time by one-half, until the forearm is flexed upon the arm and ex-

tended several times in the twenty-four hours. This technique promises good results.

Shoulder-Joint--Excision of.

The arm is elevated, the blood milked out, and Wyeth's pins introduced, one in front of and the other behind the shoulder-joint. They should be introduced through the skin for about three inches, and their points protected by corks. While the arm is held up an Esmarch bandage is applied extending from the hand to the shoulder, and a stout rubber tube carried around the shoulder above the pins, often enough to completely cut off the circulation, after which the bandage is removed.

The knife is introduced high up on the shoulder, at a point midway between the coracoid and acromion processes; it is then carried down the anterior-lateral aspect of the shoulder and arm, to the bone, with a single stroke, for four or five inches over the bicipital groove. Great care is taken not to injure the long tendon of the biceps, as its destruction materially interferes with the usefulness of the arm. The tendon is held aside by an assistant, while the capsular ligament is being severed with the scissors, freeing the head of the bone. The work is facilitated by having the assistant twist the bone as the ligaments are cut loose. When the capsular

ligament is completely severed, the head of the humerus slips out of the glenoid cavity. When the head of the bone is free, a sterilized gauze retractor is placed around the neck of the bone; the soft parts well retracted, the periosteum divided, slipped back and the head of the bone sawed off. Check all bleeding, and leave in the wound a fenestrated rubber drainage-tube, projecting through a counter-opening in the most dependent portion of the wound. The proper manner in which to make a counter-opening for drainage is by the Hilton Rosa technique; pass a pair of forceps into the wound and against its posterior wall, and with firm pressure pass the forceps through the muscles and fascia to the skin, and with a scalpel cut down upon the point of the forceps. Place the end of the tube or gauze in the grasp of the forceps and draw it into place. Close the wound with buried and superficial catgut sutures, dust with iodoform and dress with sterile gauze, cotton, and bandage, over which a plaster shoulder-cap must be applied. The arm must be bound securely to the patient's side, to insure perfect rest during healing.

Knee-Joint—Excision of (Hahn).

Elevate the limb, milk the blood out, and apply an Esmarch bandage from the foot to a point

midway of the thigh; then encircle the thigh above the bandage with a strong rubber tube to control the circulation; fasten it with a pair of forceps and remove the bandage. An incision is made from the inner condyle of the femur, up the inner side of the thigh, for four or five inches; at this point the incision is carried across the front of the thigh to the opposite and outer side, and down to a corresponding point on the outer condyle. Dissect the flap well down, leaving the patella *in situ*, until the flap is well retracted; then cut the ligamentum patellæ and remove the patella along with the entire synovial sac, which extends up the anterior aspect of the thigh for three or four inches. The crucial ligaments are cut, the head of the tibia and the lower end of the femur exposed, and sterile gauze retractors applied. The patient's foot is placed flat upon the table, and held firmly by an assistant, while the surgeon saws the end of the tibia off, running the saw perfectly level. The lower ends of the condyles of the femur are sawed to fit the tibia. If the ends of the sawed bones do not fit accurately, they can be resawed, or leveled with a bone file which is preferable. All diseased foci should be removed from the ends of the bones with a Volkman sharp spoon. The Esmarch bandage or tube is loosened, that all bleeding points may be secured. If the joint

is tuberculous, irrigate with a bichloride solution, 1 : 3,000, and apply a solution of iodoform and ether. Place the bones in apposition, with the leg flat upon the table, drilling through their edges with an awl at some four or five points, and pass through the openings strong catgut or silver wire and tie the bones together. All sutures are passed before any of them are tied. The wound is then closed with drainage and dressed with dry sterile gauze, over which a plaster dressing is applied, extending from the toes to the perineum. A window is cut in the plaster, over the knee, permitting examination of the wound. Iron braces, made at double right angles, are placed over the knee and worked into the dressing as it is applied, thus procuring perfect rest to the knee-joint. Another method of doing this operation is practiced by the London surgeons. I have often seen Mr. Herbert Allingham, at the great Northern Hospital, do this operation with the most brilliant results. A longitudinal incision, six inches long is made to the bone, down over the knee joint, exposing the patella, after which the patella is sawed through in the line of the incision, dissected back from the joint and well retracted on both sides. Apply a gauze retractor, and saw off the lower ends of the condyles of the femur, also the head of the tibia. The

bones are wired or pegged with an ivory peg, the two halves of the patella brought into apposition, and sewed with catgut sutures. A rubber drainage tube is left in and the wound closed with silkworm gut sutures. Dust with iodoform; gauze, cotton and bandage, over this plaster dressing as above. The synovial sac must be removed in all instances, otherwise it will not heal.

Hip-Joint—Excision of.

In the performance of this operation, after the application of the Esmarch bandage, Wyeth's pins and rubber tube are used as though an amputation was to be done. The rule for the application of the pins will be found by referring to AMPUTATION OF THE HIP-JOINT. The knife is introduced three inches above the greater trochanter, passed into the bone and carried down the outside of the thigh for six inches. The flaps are well retracted, and the bone dissected out with scissors; a gauze retractor is placed around the femur, the soft parts retracted and the bone sawed off below the trochanters if they are diseased; otherwise, it should be sawed above. Leave a rubber tube in for drainage, close the wound and dress with sterile gauze, cotton and bandage.

Maxilla, Superior—Excision of.

It is often advisable to do a preliminary tracheotomy before beginning this operation; although this can be dispensed with by placing the patient in the Trendelenberg position.

Make an incision, beginning at the outer angle of the eye, extending along the lower border of the orbit to the nose, thence down the side of, and beneath the nose, to the median line of and through the upper lip into the mouth.

Dissect the flap back, exposing the superior maxillary bone; the scalpel is introduced into the mouth and drawn forward over the roof, cutting through the mucous membrane, from the soft palate to the teeth. Secondly, cut the mucous membrane loose from the angle of the jaw, at a right angle. With a mallet and chisel the bone is severed from its connections, beginning at the outer angle of the eye and following the line of the incision. The floor of the orbit is saved if possible; otherwise, strip off its periosteum and remove the bone. Before chiseling through the alveolar process, the incisor tooth may be extracted on the side from which the bone is to be removed. The chisel is driven straight back, through the bone, to the soft palate. The bone is then seized with a lion-jawed forceps and twisted out. The cavity is packed with sterile

gauze, as hemorrhage is generally profuse. After a few minutes have elapsed, the gauze is slowly removed and the bleeding points, as they present themselves, are either tied, twisted or cauterized with the actual cautery; repack with gauze and close the wound. When the patient has recovered from the operation, his dentist may fit his mouth with a plate, making a very presentable face.

Maxilla, Inferior—Excision of.

As in excision of the superior maxilla, it is often necessary to do a preliminary tracheotomy; though the Trendelenberg position is generally to be preferred. An incision is made from a point half an inch below the lobe of the ear, and extending along the inferior margin of the jaw to the symphysis menti. If necessary, the incision may be extended up through the lower lip, or up in front of the ear. This extension is very bloody and liable to be followed by paralysis of the side of the face, as the temporal artery and facial nerve are cut. Dissect the bone out to the mucous membrane before opening into the buccal cavity. Secondly, a tooth should be extracted from the bone to be removed, an opening made into the mouth, and the symphysis sawed through. Seize the bone and make strong traction upon it, and with a scalpel or scissors, keep-

ing close to bone, dissect it out three-fourths of its length ; then break back and twist the bone out. This is necessary to prevent cutting the inferior dental artery. Check all hemorrhage and close the wound, leaving drainage in if considered necessary. A ligature may be passed through the tip of the tongue, drawn on and fastened to the cheek for a few days, preventing the sensation of smothering occasioned by the falling backward of the tongue and closing the glottis. The patient must wash the mouth with a solution of potassa permanganas often enough to keep it aseptic. The dressings require frequent changing, as there is considerable dribbling of saliva.

Ribs—Excision of.

Make an incision over and parallel to the rib, three inches in length, to the bone, and with a periosteal elevator detach the periosteum from the rib for two inches. It is best dissected from the inner part of the rib with the end of a small dull retractor. While the assistant retracts the flaps, a piece of sterile gauze is passed around the rib and drawn close in one end of the wound, and with bone forceps the rib is cut over the gauze. The gauze is shifted to the opposite end of the wound and the rib is cut through in the same manner. The introduction of the gauze prevents injury to the pleura when

the rib is cut. Two inches, or more, of the rib should be excised. The point of excision should always be in the axillary line, and never below the eighth rib. If more than one rib is to be excised, Estlander's technique should be employed, which consists of an incision at right angles to the ribs, only extending through the skin. Have the assistant retract the flaps and cut down on each rib in a line with the bone, removing one at a time, as in the excision of a single rib. This technique is employed when the lung is very much compressed and bound down by adhesions, that the chest wall may sink in and lie in close proximity to the lung. As soon as the rib is excised make a longitudinal slit in the pleura, allowing the pus to escape. A bat of cotton should be placed over the wound, allowing the pus to escape slowly; this prevents the entrance of air into the pleural cavity, thereby impeding sudden collapse. To secure the best drainage the patient is placed upon the side; a double rubber drainage tube passed into the pleural cavity and secured with a safety-pin. No irrigation is permissible in these cases, consequently a thick, dry, cotton dressing is applied, and removed as often as it becomes soiled from the discharge. An excellent dressing to these wounds is a four-per-cent mixture of balsam Peru and oleum ricini, applied on gauze or cotton.

FRACTURES.

From a surgical standpoint a fracture is a sudden solution of the continuity of a bone or cartilage. Fractures are simple, compound, comminuted, single and multiple. A fracture communicating with a joint or any cavity of the body is a complicated fracture. All fractures should be treated by rest; this is best attained by the use of splints and plaster dressings. The symptoms of fracture are: loss of function, pain, preternatural mobility, crepitus and absence of the normal contour of the parts. In an impacted fracture no crepitus is present. If the fracture is in one of the limbs shortening is present as a rule. It is often difficult to diagnose an impacted fracture, because crepitus and immobility are absent, although pain is present on pressure, with shortening and some thickening at the point of impaction.

The use of the Röntgen rays furnishes us the best means of diagnosis, and should be employed in all cases of fracture if possible.

In the reduction of a fracture, great care should be exercised that no intervening substances, such as muscle, tendon, or other tissue, exist; as they interfere with the production of callus, and ununited fracture may follow. Union

generally begins to take place in ten days in the adult, and somewhat earlier in children.

All forms of fracture, after the age of thirty years, become more intractable to treatment. In a complete fracture, with displacement, reposition without shortening, is almost impossible. The best that can be done is to reduce the parts to as near the normal as possible and retain them there, by the proper dressings, until union takes place.

The treatment of each fracture will be given under its respective head.

Skull—Fracture of.

Fractures of the vault of the skull are usually due to direct violence, while those of the base are due to indirect violence. In every suspected fracture of the vault of the skull an exploratory incision is perfectly justifiable, and should be made. In all cases of depressed fracture of the skull, the depressed bone should be elevated and the fragments of bone removed. Fracture of the skull, from whatever cause, should be operated upon at once—unless shock is too profound, then it should be delayed until reaction takes place. In every case of fracture with compression of the brain, which suddenly produces paralysis, an immediate operation is demanded. The field of operation is rendered as

sterile as possible, before the operation is attempted. Fractures of the base of the skull are generally treated expectantly.

Nose—Fracture of.

Fracture of the nose is due to direct violence, and demands immediate attention. The depressed bones should be elevated into their normal position by the introduction of a slender-billed dressing forceps into the nostrils. When the normal contour of the nose is secured, a slender steel pin is thrust through it from side to side, either through or beneath the line of fracture. If necessary, the nose may be plugged with sterile gauze, thus maintaining its normal shape. When hemorrhage is severe, it is controlled by anterior and posterior plugging. The pin is left *in situ* until union has taken place, which is generally about ten days. A strip of iodoform gauze is wound about the pin in the form of figure of eight. The nostrils must be frequently irrigated with a warm normal salt solution.

Bones of the Face—Fracture of.

Fracture of the bones of the face is due to direct violence, and they should be restored to their normal contour as soon as possible. These fractures are generally compound, consequently

the wound is rendered aseptic, hemorrhage checked, the contused edges trimmed off and the fragments of bones replaced. It is not permissible to remove a single fragment of bone if it can be saved. The wound is closed with fine catgut sutures and dressed with an aseptic dressing.

Inferior Maxilla—Fracture of.

In fracture of the inferior maxilla, the most prominent symptoms are pain, crepitus, and loss of function, with occasional deformity. It is generally due to direct violence.

The fracture must be adjusted and the parts kept at rest. For temporary purposes the four-tailed bandage serves well. The best permanent dressing is Hamilton's dressing for fracture of the inferior maxillary, but a good substitute for it can be made by soaking a piece of sole-leather or cardboard in water, molding it over the chin and securing it there with the four-tailed bandage. Sometimes it is necessary to extract a tooth before the reduction of the jaw can be accomplished. Occasionally the fragments will have to be wired together with silver wire, especially in cases of delayed union. Under favorable circumstances union generally takes place in three to five weeks. Liquid food must be given. Patient is not allowed to talk, and must lie on the back.

Clavicle—Fracture of.

The clavicle is more frequently fractured than any other bone in the body, excepting the radius. It is generally fractured through the middle third, between the trapezius and the sternomastoid muscles. This fracture is either due to direct or indirect violence. The inner end of the bone is left in its normal position, while the outer end is drawn down by the weight of the shoulder and arm. This fracture is easily recognized by the presence of pain, loss of function, and deformity.

Reduce the fracture by carrying the arm and shoulder backward, and at the same time elevating it. Apply the Sayer dressing, which is, by far, the simplest and best. Take a strip of strong rubber adhesive plaster (moleskin), three inches wide and long enough to reach around the body. Just above the elbow of the arm on the injured side, the end of the adhesive strip is passed around the arm, with gummed side next to arm, and secured with a safety pin; then a soft pad of cotton is placed in the axilla, the shoulder raised, and arm drawn well back, while the strip of plaster is carried around the body, fastening it closely to the skin. The second strip, which is several feet in length, with a split three inches long near its middle for the

accommodation of the elbow, is applied over the forearm, which has been brought across the chest, with the spread hand resting upon the sound shoulder. The plaster is carried over the shoulder to meet the opposite end of the strip, which has been brought up over the back. The two ends are secured with safety pins.

Clavicle Dressing (Simon).

Place a padded ring around the sound shoulder, tie a strip of bandage around the crippled arm just above the elbow, pass across the back and tie tightly into the ring. Second, tie a strip of bandage around the crippled forearm; pass across the chest and tie snugly into the ring, and over this a few turns of a roller bandage, thus completing the dressing. The principle of this dressing is very similar to the Sayer dressing. The ring around the shoulder is made of a strip of bandage and padded with cotton.

Clavicle Dressing (Mayer).

Take a cotton cloth or piece of gauze, one yard or more square, and fold it, making a triangle. Place it across patient's breast, with apex down, and tie tightly behind. Now bring the apex of triangle up between the chest and the forearm, thus forming a sling for the forearm. Then apply a roller bandage, beginning at the

point of the shoulder, and carry the bandage completely around the body, securing absolute rest to the clavicle.

Fracture of the Arm.

Fracture of the arm may occur at any point along its course, though more frequently in its lower third. Reduction of the fragments is secured by flexing the forearm and making extension, having the shoulder steadied by passing a sheet around the body just beneath the axilla, upon which an assistant is to pull while extension is made on the arm. When the reduction is made, a layer of cotton is placed around the arm and a roller applied, thus preventing a recurrence of the displacement. Over this is applied, snugly, a plaster of Paris dressing at least an eighth of an inch thick. The dressing must extend from the hand to the shoulder, over which a spica is formed. The forearm is flexed on the arm before the plaster dressing is applied. After the plaster dressing has hardened, it should be split throughout its entire length, to guard against swelling. If the arm seems to shrink away from the dressing, then a strip one inch wide is cut out and the dressing tightened by the application of a roller bandage over it.

If plaster of Paris is not to be had, then cardboard, sole-leather, gutta percha, or felt splints may be molded over the shoulder, forming a shoulder-cap, and extending down over the scapula, pectoralis major and arm, over which a well-fitting bandage is applied. Plaster of Paris is the dressing *par excellence* for all fractures, where it can be used. In fracture of the shaft of the humerus, the musculospiral nerve is often injured, causing paralysis of the extensor muscles and wrist-drop. In such cases it is advisable to cut down upon the fracture and repair the nerve by suture or relieve it from pressure.

Fracture of the condyles of the humerus are of not so frequent occurrence, though the internal is fractured much more frequently than is the external. The surgeon should be very guarded in his prognosis in fractures of the elbow joint, as it is generally permanently injured, due to extensive callosities, slight displacement, and deformity. Fractures of the condyles of the humerus should be dressed with well-padded angular splints, the forearm flexed upon the arm and the thumb pointing upward. The dressing is removed at the end of two weeks and the forearm extended, thus preventing ankylosis. The degree of ankylosis depends upon the amount of joint complication.

Olecranon—Fracture of.

The olecranon is generally fractured by a fall upon the elbow, the displacement being upward. Extend the forearm fully and apply Hamilton's splint as follows: Make a thin board splint three inches wide and long enough to extend from the hand to within two inches of the axilla. Cut a deep notch in each side three inches below the level of the line of fracture. Pad the splint well with cotton, making it twice as thick at the bend of the elbow as elsewhere; wrap with a roller bandage and place it upon the anterior surface of the extended forearm, securing it by a few turns of the roller bandage at each end. Then, with a flannel roller, begin at the fingers and bandage the forearm until the notch in the splint is reached, through which the bandage is passed, carried above and behind the displaced fragment, then return to the notch. This procedure is repeated until the fragments are approximated, when the whole is secured by a continuation of the roller. After one week the fracture must be inspected, and, if the fragments have drawn apart, they must be readjusted by the application of a new roller. In five or six weeks the dressings are removed and passive motion made, exercising great care not to rupture the union, which is always ligamentous.

Forearm—Fracture of.

The radius is more frequently fractured than the ulna, and generally in its lower third. After reduction by extension and counter-extension, the forearm is placed in a supine position and a well-padded splint—slightly broader than the forearm and long enough to extend from the tips of the fingers to the bend of the elbow—is applied, placing a similar one on the back of the forearm. They are secured by the application of a roller bandage, leaving the thumb pointing upward and the forearm to be carried in a sling.

Colles' Fracture.

Colles' fracture is more frequent than any other fracture in the body. This fracture is generally transverse and within one inch of the articular surface, and is due to indirect violence produced by a fall upon the over-distended hand. The lower fragment usually overrides the upper, producing the silver-fork deformity. With the back of the patient's hand turned toward the surgeon, the wrist is held steady with one hand, and pressure made on the lower fragment, while with the other hand, that of the patient is grasped and carried strongly backward, at the same time making extension, dislodging the lower fragment and bringing the hand down

straight. This is done as in opening and closing the door, repeating until reduction is secured. After reduction, the fracture is best dressed with a snug plaster dressing, extending from the metacarpo-phalangeal articulation, to a point six inches above the wrist-joint. If plaster of Paris is not available, then dress the fracture with a well-padded palmar splint, extending from the tips of the fingers to the bend of the elbow, and sufficiently broad to protect the arm from lateral pressure. This is held in position by a roller bandage. The fingers should be worked every day to prevent adhesions of the tendons. Remove the splint in six weeks, but do not use the arm until all soreness has disappeared.

Carpus, Metacarpus and Phalanges—Fracture of.

Fracture of the carpus is due to direct violence, and is usually compound. The treatment is fixation, rest and drainage, under antiseptic precautions.

The metacarpal bones are most frequently fractured by direct violence; symptoms same as for other fractures. Reduction is accomplished by extension. The dressing consists a palmar splint, padded and arched to fit the concavity of the hand; also a posterior splint, padded with cotton, is applied, and secured with a roller bandage. The fingers should be worked every

day to prevent fixation of the extensor tendons. In fracture of the phalanges, the hand is dressed on a padded palmar splint, and the broken finger worked the sixth day, preventing fixation of the tendons.

Sternum—Fracture of.

Fractures of the sternum must be reduced by lifting the fragments with an elevator or by pressure. When the fragments have been reduced, the most perfect rest is secured by a number of turns of the roller bandage around the chest.

Ribs—Fracture of.

Fracture of the ribs occurs from direct or indirect violence. They are generally broken just anterior to the middle of the bone. Immediate hemorrhage from the intercostal artery is the great danger, always followed by inflammation of the pleura. The displaced fragments may be reduced by pressure. In fractures of the rib there is frequently present all the signs of fracture.

Perfect fixation of the side is the great desideratum in these cases. Strap the affected side with rubber adhesive strips, one or two inches wide and long enough, to cover the entire length of the rib. They are applied from a point about four inches above, to a point about four below the broken bone, allowing each succeeding

strip to overlap the previous one for about half of its width; over this may be applied a flannel roller.

Vertebræ—Fracture of.

The vertebræ are fractured by direct and indirect violence. In fracture of the vertebræ, followed by immediate or subsequent paralysis, an operation is demanded for the removal of any fragment of bone pressing upon the cord; unless the injury is so high as to interfere with the circulation and respiration, to such an extent that the operation is contraindicated. After paralysis of several months' duration, though the operation is demanded, as a rule the prognosis is unfavorable. For the performance of laminectomy, the patient is placed in a prone position, slightly on one side, rendering respiration easier. An incision, eight inches in length, is made over the vertebral spines; the middle of which, corresponds to the seat of fracture. The incision is strongly held open with toothed retractors, while the muscles are scraped from their attachments, exposing the laminæ, which are cut through with bone forceps and removed, thus bringing the dura well into view. The wound is dried with sterile gauze and the dura is opened, through which opening a grooved director is passed and the wound in the dura extended. Hold the wound in the dura open

with thumb forceps, pass a fine probe and search, both above and below for any spicula of bone which may be pressing upon the cord. The dura is closed with fine catgut sutures one-sixteenth of an inch apart. The muscles are closed with catgut and the skin with silkworm gut sutures. A small catgut drain should be left projecting from the lower end of the wound. The patient should be kept on his back for several days and treated under the most antiseptic precautions. Dress the wound about the fifth day.

Fractures of the sacrum and coccyx are rare and demand no treatment, other than perfect rest, unless necrosis supervenes, when the dead bone must be removed. In fracture of the coccyx, when the nerves are pressed upon and great pain experienced, the bone must be removed. An incision is made over the coccyx, down to the bone, throughout its entire length, the muscles dissected loose and the bone removed. The wound is closed with catgut sutures, dressed with a strip of iodoform gauze and flexible iodoform collodion. Great care must be exercised not to wound the hemorrhoidal plexus of veins or the rectum.

Os Innominatum—Fracture of.

This bone is rarely fractured, though the ilium ischium, or pubis, may be broken, singly or

collectively. This is due either to direct or indirect violence. A fall upon the foot, or the great trochanter, may drive the head of the femur through the acetabulum, fracturing all three of the bones forming it.

If fracture of the acetabulum is suspected, digital examination should be made by the rectum and vagina.

The treatment consists in reduction by extension (Buck's method) and rest. Fixation is secured by the application of plaster of Paris dressing. Rupture of the bladder and urethra sometimes occurs in fracture of the pubis: in such cases incise and drain.

Neck of the Femur—Fracture of.

This is a fracture peculiar to the aged, occurring most frequently among women, and is generally due to indirect violence, as a fall upon the foot or knee. Fracture of the neck of the femur is accompanied by pain, loss of function, inversion of the foot, shortening and crepitus. These symptoms are not always present; but pain in the hip, and inversion is the rule. Shortening is determined by measurement of the two sides; draw a line from the anterior-superior spinous process of the ilium to the inner malleolus. The legs must be in a straight line with the body and fully extended when the measurement is made. The

shortening varies from one-eighth to one inch. To determine if the shortening is between the trochanter and acetabulum apply "Nelaton's test": "Draw a line from the tuberosity of the ischium to the anterior-superior spine of the ilium: this line passes over the upper surface of the greater trochanter. The distance the top of the trochanter is above this line shows the degree of shortening." The treatment is rest and position; the patient is placed on a hard mattress in a supine position, the fracture adjusted, and the leg held in position by the use of sand or bran bags placed along the leg; the foot of the bed is elevated on blocks of wood eight or ten inches, and Buck's extension applied. To this may be added Hamilton's long splint, which is well padded with cotton and applied to the outside of the leg and tied on with strips of gauze.

Extension is applied as follows: A strip of moleskin adhesive plaster, three inches wide and several feet long, is applied, one on the outside of the thigh and leg extending beyond the sole of the foot; the other is applied along the inner side of the limb, and both secured by the roller bandage. A piece of board six inches in length is fastened between the two ends of the strips below the sole of the foot, thus preventing pressure on the malleoli. To this board is at-

tached ten or twelve pounds, suspended over a pulley fastened to the foot of the bed—the body furnishing counter-extension. The limb is maintained in its normal position by the use of long sand bags. If the proper extension can be accomplished, and the limb made to assume the same length as the sound one, a plaster dressing may be applied. Fracture of the trochanter is treated by bandage and rest.

Fracture Through the Trochanters.

This fracture is of rare occurrence. Buck's extension and Hamilton's long splint is the treatment for these cases. The plaster dressing may be used here under anesthesia. Large exostosis sometimes follows this fracture.

Femur—Fracture of.

The shaft of the femur is generally broken by direct violence, but may be due to indirect violence or to muscular contraction. If the bone is broken in its upper third, the upper fragment is rotated, upward and outward and toward the front of the thigh, while the lower fragment is drawn upward. If the fracture is in the lower third the lower fragment is drawn backward, while the upper is drawn slightly forward. In complete fractures of the femur there is generally overlapping of the ends of the bone. The

usual signs of fracture, with shortening, suffice for a diagnosis. If the knee-joint is involved it becomes much swollen. The bone is sometimes fractured at the condyles.

In all fractures of the thigh above its middle, Hamilton's long splint, with Buck's extension, is the best treatment; but if the fracture is below the middle of the femur, the plaster of Paris dressing is to be preferred, and may be applied at once. I have often employed it without anesthesia. In the majority of cases it should extend from the toes to the perineum, and is better carried up over the hip, forming a spica. In all fractures of the femur, immobility must be maintained for six weeks, at the end of which time, if the knee-joint is involved, passive motion must be made. In fracture of the femur in children immediate immobility in a plaster dressing is the best treatment.

Patella—Fracture of.

This fracture is due to direct violence, a fall or a blow upon the knee, or contraction of the quadriceps extensor muscle. If due to muscular contraction, the fracture is transverse; if to direct violence, it may be longitudinal or stellate. The fragments are often separated from one to three inches. As soon as a diagnosis is made, the patient should be put to bed, with

the leg fully extended, and the following dressings applied. Take two strips of strong moleskin adhesive plaster, eight inches wide and sixteen inches long, and trim one end of each to a tongue; to one of these tongues a buckle is attached, and the strip snugly applied to the front of the thigh just above the knee, the other one below. They are secured by a few turns of a roller bandage. The tongue of the lower strip is now passed through the upper one and drawn upon, thus perfectly coaptating the fragments. The limb is then enveloped in a plaster dressing, extending from the toes to the perineum, leaving a window over the knee, that the buckle may be drawn upon every day or two, maintaining the fragments in perfect apposition. If the plaster dressings become loosened from shrinkage of the limb, cut out a strip its entire length, applying a roller bandage over it to make it fit the leg. At the end of ten days the patient may walk about with crutches. This dressing should remain on for two or three months, then be removed, and slight passive motion made at the knee, at the same time supporting the patella. Another plaster dressing is then applied and worn for one month and then removed, and passive motion made. This treatment must be continued for six or eight months; and, when left off, a light tin splint fitted to the posterior upper part of the

leg and lower part of the thigh should be worn in daytime for several months. Atrophy of the muscles of the thigh and calf of the leg always accompany the treatment of this fracture, but should excite no concern, as they assume their normal state by use. If the above details are adhered to, the function of the limb will be perfectly regained.

Fractured Patella—Operation For.

Under the strictest asepsis a transverse incision is made across the front of the knee-joint opening between the fragments, or a longitudinal incision may be made over the front aspect of the knee joint, exposing the fracture. The clots, along with all shreds of tissue, are turned out, and the cavity of the knee-joint wiped perfectly dry with sterile gauze. The fragments are then drilled with a large awl, introducing the instrument half an inch from their fractured margins and passing through the patella obliquely, allowing the awl to emerge just outside the cartilage covering the posterior aspect of the bone. Through these openings, silver wire of large size is passed and the fragments brought together; after which, the wires are twisted. The wires are cut short, bent down, and their ends buried in the tissues covering the bones. The tissues are closed with catgut, including the skin, leaving in drainage for a short time.

The after treatment is the same as given above in the treatment of fractured patella. In compound fracture of the patella, the joint must be cleansed with the most scrupulous care, using bichloride solution freely, the fragments wired, and the after treatment carried out as above.

Leg—Fracture of.

Fracture of the leg is generally due to direct violence, and most frequently occurs at the junction of the middle and lower third. One or both bones may be broken. If the tibia alone is broken, the displacement depends upon the line of the fracture. If the bone is broken high up, the fracture is usually transverse, with very little displacement; but if broken in the middle or at the lower third, the obliquity is generally considerable, and from below upward and backward. Consequently, the upper fragment is usually displaced forward to quite a degree. If both bones are broken, overlapping and displacement is the rule.

Treatment—Reduce the fracture by extension and counter-extension, enveloping the limb in a thick layer of cotton, over which a roller bandage is applied. Over this, extending from the toes to midway of the thigh, a plaster of Paris dressing is applied. This dressing is applicable in all fractures of the leg and foot. Split the dress-

ing down the front to guard against swelling. It should be worn for two months, then removed, and passive motion made; care and rest complete the cure.

Potts' Fracture.

This fracture is generally due to throwing the weight of the body upon the partially everted foot, as when alighting from a train or street car. This fracture consists in the fracture of the internal malleolus, separation of the ankle joint and fracture of the fibula two or three inches above the external malleolus. The best dressing is the plaster dressing. The foot should be dressed in a perfectly straight position and held so until the plaster hardens.

If, in compound fractures, the plaster dressing is used, windows must be cut in the dressings for inspection and drainage. Fracture boxes should never be used, only as a last resort, and then temporarily.

Tarsus and Metatarsus—Fracture of.

Fracture of any of the bones of the foot is due to direct violence, and is generally a compound fracture, with contusion. Fixation of the foot, under asepsis, with the plaster dressing is the best treatment. If it is a compound fracture, windows should be cut in the dressing for inspection and drainage, this being very necessary for

cases where there is great contusion, as sloughing is liable to occur.

In simple fracture of the toe, a pasteboard splint is applied and molded to the toe, and the foot enveloped in a plaster of Paris dressing.

DISLOCATIONS.

A dislocation is the displacement of the articular surface of one bone from another. Dislocations are partial, complete, simple, compound and complicated. There is always more or less injury to the tissues around a joint, even when the dislocation is only partial. In all dislocations there is some pain, loss of function, and asymmetry.

Inferior Maxilla—Dislocation of.

This dislocation may be either unilateral or bilateral. If unilateral, the chin projects and points toward the sound side. If it is a bilateral dislocation, the entire under jaw protrudes, with the teeth in advance of those of the superior maxilla, mouth open, with saliva dribbling over the chin.

Reduction may be accomplished by wrapping the thumbs with a cloth, passing them into the mouth and placing them upon the inferior molars,

pushing downward and backward; at the same time, raising the chin with the fingers and pushing it backward; or place a cork between the posterior molars on both sides, raise the chin and push backward. If the above methods fail, they should be repeated under anesthesia. As soon as the condyles are forced below the eminentia articularis, the temporal muscles draw the jaw into its normal position. Should this fail, a cutting process is the last resort, and is done as follows: A horizontal incision is made on each side, just below the zygoma, exposing the condyles in their false position; introducing a stout instrument and using the tubercle of the zygoma as a fulcrum, the condyles are prized into place. After reduction, the treatment is the same as given for fracture of this bone.

Clavicle—Dislocation of.

Dislocation of the clavicle is rare, but the sternal end is sometimes dislocated, either forward or backward. After reduction, a compress placed over the dislocation and held in place by the application of a roller bandage, is the best treatment. Sayer's clavicle dressing may be used to good advantage in these cases to prevent a redisplacement.

Shoulder Joint—Dislocation of.

Dislocation of the shoulder joint may take place in any one of three directions: backward, sub-acromial; forward, sub-coracoid or sub-clavicular; and sub-glenoid. The sub-coracoid dislocation is the most frequent; after which, the sub-glenoid. The capsule of this joint is always ruptured in complete dislocation of the head of the humerus.

The sub-acromial is a backward dislocation, and becomes complete should the head of the bone pass back under the spine of the scapula. This dislocation is reduced by extension and counter-extension in the line of dislocation. Counter-extension is applied by passing a sheet around the patient's body beneath the axilla. In dislocation of the shoulder there is loss of function, pain, and deformity of the shoulder. If the hand of the injured side is placed on the opposite shoulder the elbow is abducted and can not be brought down flat on the side; while, if fracture existed, it could be done. There is also increased measurement around the shoulder over the acromion process; often the head of the humerus can be felt in its abnormal position. Sometimes dislocation of the shoulder can not be reduced. I recall a case of this kind, seen in Edinburgh. After repeated efforts,

employing all the modern methods of reduction, the humerus suddenly gave way through the surgical neck. In this case McBurney's operation was done. An incision was made over the joint, the head of the bone exposed and drilled into; and, with a steel hook, an attempt was made to replace the bone, resulting in utter failure. The head of the bone was then excised and the wound closed, with drainage. At the time of dislocation or reduction the axillary vessels or nerves may be permanently injured, followed by grave conditions.

Reduction of the shoulder is accomplished by placing the patient upon his back on the floor or a table; place the foot, with shoe off, in the axilla, carrying the arm out at right angles to the body, making strong traction and gradually bringing the arm to the side, pressing the heel well up into the axilla. This raises the head of the bone over the rim of the glenoid cavity, and is best done under anesthesia. This failing, place a strong cloth around the patient's body, fitting up into the axilla, and have the assistant make traction, while the surgeon grasps the arm at its middle with one hand and the elbow with the other, bringing the arm to right angles with the body and in the direction of least resistance. Make a steady pull on the arm and rotate. This proving futile, carry the arm

higher and repeat the manipulation. Another method is to seat the patient in a chair and draw the arm over your knee, your foot being placed upon the seat occupied by the patient; grasp the arm with one hand and the affected shoulder with the other; press the arm down over the knee: and, at the same time, manipulate the head of the bone and press it into place. Extension may be made on the forearm.

Elbow-Joint -Dislocation of.

The radius may be dislocated backward, or both bones may be dislocated anteriorly, posteriorly, or laterally. The dislocated radius is reduced by flexing the forearm upon the arm and pressing the head of the radius into place; also, by making extension on the forearm, at the same time pressing the head of the bone into position; place a pad over the head of the bone and dress the joint, carrying the forearm in a sling for several weeks. This dislocation is likely to recur.

Dislocation of both bones, backward, is reduced by seating patient as in the reduction of the shoulder joint. Place your knee in the bend of the elbow, make extension on the forearm, at the same time flexing it around the knee. The arm is dressed on a splint, and left for a week or more. Forward dislocation is rare without frac-

ture of the olecranon. It is reduced by steady-
ing the arm, making extension on the forearm
to disengage the olecranon, and pressing the
forearm downward and backward. Absence of
the olecranon from its normal position, supina-
tion of the arm, pain, and limited motion will
suffice for a diagnosis. Dress the arm, flexed at
right angles, and keep at rest for two weeks.
Lateral displacements are generally incomplete,
and only require reduction and rest.

Wrist-Joint—Dislocation of.

This dislocation is of rare occurrence and
must be differentiated from Colles' fracture.
Reduction by extension and counter-extension.

Fingers—Dislocation of.

Dislocation of the metacarpal bones is rare.
The phalanges are sometimes dislocated, and are
reduced by extension and counter-extension.
This is best done by passing a stout tape through
two holes bored in a strip of wood placed on the
palmar side of the finger; the tapes are drawn
tightly, and with extension the finger is pulled
into place.

Hip-Joint—Dislocation of.

Practically there are four dislocations of the
hip: *first*, upon the dorsum of the ilium: *second*,
into the ischiatic notch; *third*, into the obtura-

tor foramen; *fourth*, upon the os pubis. About one-half of all dislocations of the hip occur on the dorsum of the ilium. The injury to the soft parts is always severe, the ligamentum teres invariably being torn. Symptoms of dislocation on the ilium—the thigh is flexed upon the abdomen, the leg upon the thigh, with the greater trochanter nearer the anterior-superior spine of the ilium than that of the sound side; the great toe points to the instep of the well foot; there is one or two inches' shortening, with rigidity of the muscles. Under anesthesia the patient is placed in the dorsal position, either on the floor or on a table; the leg is grasped above the ankle with one hand and just below the knee with the other; flex the leg on the thigh and the thigh upon the abdomen; adduct the thigh and carry the knee outward and downward, bringing the leg flat upon the floor (Bigelow). If this does not reduce the dislocation, the procedure should be repeated. As a last resort, this reduction is secured by extension and counter-extension, by use of the various pulleys, etc., Crosby's or Hamilton's methods.

For reduction of dislocation into the ischiatic notch the mechanism is the same. When the head of the femur reaches the rim of the acetabulum, it may be deflected into the thyroid foramen; consequently this is to be guarded.

Reduction of dislocations in the thyroid foramen (Bigelow): With the patient anesthetized and in the dorsal position upon the floor, flex the leg on the thigh, and the thigh upon the abdomen; slightly abduct the leg, rotate the femur inward, at the same time adduct and carry the leg flat upon the floor.

Reduction of dislocations upon the pubis (Hamilton's method): When the head of the bone is over the rim of the pelvis, the thigh is abducted and rotated outward, to lift the head of the femur over the pubis; the thigh is then flexed upon the abdomen, adducted, and brought down. Stop outward rotation as soon as the head has risen above the pubis.

Extension and counter-extension has been practiced for the reduction of all these dislocations, but the trend of modern surgery is to secure reduction by manipulative methods.

The after-treatment of dislocation of the hip-joint, consists in fixation and rest for six or eight weeks. This is best secured by the application of a pasteboard or leather cap, molded over the hip-joint, thigh and leg, and secured by roller bandages. The limb is first enveloped in cotton, over which the splint and bandage are applied. The bandage should form a strong spica over the hips. Better still is the plaster of Paris dressing.

Knee-Joint —Dislocation of.

This dislocation is rare and generally only partial. When it is complete, there is considerable destruction of the soft parts; and, with laceration of the popliteal artery, amputation is necessitated. Reduction is effected by extension and counter-extension, combined with manipulation. Dressing—sandbags along the side of the leg, with Buck's extension. Prognosis unfavorable. Shock is more profound than in any other dislocation.

Patella —Dislocation of.

This dislocation is very infrequent and is due to direct violence or to muscular contraction. The displacement is easily recognized, and reduced by fully extending the leg, and relaxing the quadriceps-extensor muscle. The bone is readily pushed into place. After treatment, a well-fitting rubber knee-cap.

Ankle-Joint—Dislocation of.

This dislocation is generally partial and inward, with the sole of the foot looking outward. It must be differentiated from Potts' fracture, and the dislocation of the astragalus from the os calcis. The outward dislocation is the opposite to the inward. Reduce by extension and

counter-extension : dress with splint and bandage, until all swelling subsides, then substitute the plaster dressing.

Backward or forward dislocation may occur and demand the same treatment. All of these dislocations are liable to be associated with fracture, often compound; in such cases, perfect asepsis is demanded.

Tarsus, Metatarsus and Phalanges Dislocation of.

All of these dislocations demand reduction and rest—allowing the toes and fingers to be moved occasionally to prevent adhesion of the tendons to their sheaths.

Vertebræ—Dislocation of.

Dislocation of the vertebræ may occur between any two vertebræ; and is, in all cases, a very serious matter, as it presses upon the spinal cord.

If the pressure is sufficient, complete paralysis is the inevitable result, below the point of compression. Reduction may be attempted by extension and counter-extension, with some hope of success. (For further data refer to some general surgery.) Dislocation of the atlas from the occipital bone, may be regarded as always fatal; as the cord is generally lacerated at the time of luxation, beyond repair.

Ribs—Dislocation of.

Dislocation of the ribs is due to direct violence, and may occur at their vertebral attachments, or at their anterior attachments, with their cartilages ; treatment as for fracture.

BANDAGING.

The proper application of dressings and the bandage is one of the most important prerequisites to scientific surgery; therefore, it is important that the surgeon be quite familiar with the different bandages and their mode of application, making it his business to acquire skill in this department of surgery; as, undoubtedly, many patients have lost their lives from poorly-applied dressings; an unsightly dressing often provokes the most adverse criticism of the surgeon and his work. It is not my purpose to enter into a full description of the different bandages and the modes of their application; but simply to speak of those which are most commonly used in every-day practice.

Bandages are made from unbleached muslin, domestic, gauze, canton-flannel and flannel. They should be from one-half to four inches wide and from three to twelve yards in length.

The material is either torn or cut into strips of the desired width and length, and tightly rolled on a bandage roller; after which, they are kept for use in a closed dry jar or tin box. If the bandage is rolled from both ends, we have a double-headed bandage. The application of the bandage is as follows: With the bandage held in the right hand, the end is drawn out and with the left hand applied to the part at which the bandage begins, and held in place by the thumb until it is secured by the bandage carried around the limb. As the bandaging progresses each turn is made to overlap the preceding turn, one-half of its width. If the parts are conical, as the calf of the leg, or forearm, the bandage may be smoothly applied, by the reverse. Circular turns, are those which pass around the limb, one directly over the other, while the spiral turns pass up the limb, each one overlapping the other. The oblique turns pass up the limb without overlapping, leaving space between.

Recurrent turns are those used in dressing stumps or the head. The bandage is passed across the stump, caught and returned to the starting point. This is repeated several times, and the bandage held at the side by circular turns. The spica and figure-of-eight bandage is one in which the bandage produces, by oblique turns, two loops forming the figure of eight; by

repeating these turns the spica is built up. The reverse bandage is applied in the following manner: Place the end of the bandage upon the point where the bandage is started and make a few circular turns until the conical portion of the limb is reached: then, with the left hand, hold the bandage securely on the limb and relax the tension on the roller, carrying the right hand from supination to pronation, passing the roller to the left hand beneath the limb, making traction. Repeat this technique until the bandage is applied.

Fingers—Bandaging of.

To bandage the fingers, employ a bandage three-fourths of an inch in width and five yards long. The first two turns of the bandage are made around the wrist and carried down over the dorsum of the hand to the tip of the finger, which is then covered by spiral or reverse turns. For each succeeding finger, the bandage is returned to the wrist and begun in the same manner. In burns of the fingers, with great damage to the soft parts, the fingers should not be bandaged separately; but must have cotton placed between them to prevent adhesion, and a single bandage applied over the entire hand. If all of the fingers are to be bandaged, the bandage should be one inch wide and five yards long. To bandage the fingers of the left

hand begin with the little finger. If it is the right, begin with the index finger, returning to the wrist for each succeeding finger in all cases. The thumb is bandaged in the same manner. This is known as the gauntlet bandage.

Application of Bandage to the Hand and Forearm.

With the roller bandage in the right hand, the free end is placed around the palm and carried around, above and below the thumb, forming the figure of eight, with an extension of circular turns up the forearm, until the conical portion is reached, when the bandage is completed with the reverse. The arm may be included by a continuation of the bandage.

Leg—Bandaging of.

Carry the bandage around the foot just behind the ball of the toes; and, with a few circular turns, cover the anterior half of the foot. The bandage is then made to form a figure-of-eight around the heel, and carried up the leg, in the same manner as that of the forearm and arm.

Figure of Eight for the Elbow-Joint.

Make the first turn around the forearm at the junction of the middle and upper third; and carry the bandage to the highest part of the

arm, upon which it is to extend, allowing each succeeding turn to come closer together. The figure-of-eight bandage to the knee is applied in the same manner.

Spica for the Shoulder-Joint.

One or two turns of the bandage is made around the arm, just at the lower border of the axilla, and the bandage carried across the chest (if it is the right side, and across the back if the left), under the opposite axilla to the starting point; it is then carried around the arm, overlapping the first turn, forming a spica over the middle line of the shoulder; this is repeated, passing upward until the entire shoulder is covered. The descending spica is applied by running the bandage from above downward; until the first turn of the roller is reached.

Spica of the Hip and Groin.

The bandage is carried around the thigh, close to the perineum (if it is the left side the bandage is applied throughout from right to left and *vice versa*), thence obliquely across the pubis, lower part of the belly, and the crest of the ilium, around the back and down to the starting point; passing across the front of the thigh, forming the beginning of the spica, which should be directly in the middle line of the lateral aspect

of the hip-joint, if for the hip; but if for the groin, it should cross in the middle line of the anterior aspect of the thigh. Repeat this technique, overlapping two-thirds of the width of the bandage, on the hip or in the groin, converging as the crest of the ilium is reached, until the turns of the roller overlie as they cross the back. In all ascending spicas, the position of the crossing is determined by the lower border of the bandage, and *vice versa*; they should all cross in a straight line if well applied.

A double ascending spica is begun by passing the bandage around the waist; carrying it obliquely downward across the belly, pubis, and left thigh, around the left thigh and up to the left iliac crest, forming the first spica, across the back obliquely downward, across and around the right thigh; thence across the belly obliquely to the left iliac crest forming the second spica on the left hip-joint. These turns are repeated overlapping two-thirds of the preceding turn until the spicas are completed. It will be observed that there are three lines of crossing, one over the middle line of each hip, and one over the middle line of the belly. The descending spica is applied from above, downward, with the same turns as for the ascending. A double spica may be applied to the shoulder in the same manner.

Spiral Bandage of the Chest.

For injuries of the chest the spiral bandage is the best. It is made to encircle the waist and to ascend to the axilla by spiral turns, each succeeding turn overlapping one-half. The bandage is prevented from slipping down by carrying a strip of bandage over each shoulder and securing them to the bandage around the chest with safety pins.

Spica of the Breast.

A spica of the breast may be single or double. The bandage for a single spica should be twelve yards long and two inches wide. Place the end of the bandage over the scapula of the affected side and carry it over the sound shoulder, beneath the affected breast, and around the chest to the starting point. Repeat this turn twice, and carry a circular turn around the chest, including the lower border of the mammary gland, and forming a spica with an oblique turn. Alternate these circular turns with the oblique, passing over the shoulder, overlapping until the breast is covered. The crosses of the spica should be in the same line. The roller for a double spica should be sixteen yards long, and is applied in a similar manner to the single, making an oblique turn over each shoulder to each circular turn that is made.

Head Bandages.

Barton's bandage consists of a roller five yards long and two inches wide. Begin the bandage behind the left ear (left, if standing behind the patient ; right, if standing in front), carry the bandage down under the occiput and up to a corresponding point behind the other ear; then across the vertex down the side of the face under the chin, and up the other side of the face to the vertex, intersecting the former turn in the middle line, then to the starting point around under the occiput. The bandage is now carried forward along the body of the inferior maxilla, around the chin and back along the jaw on the opposite side to the starting point. Repeat these turns four times. Useful in fracture of the lower jaw.

Handkerchief Bandage for the Head.

This bandage is made of a piece of cloth thirty-two inches square; bring the opposite corners together, forming a triangle: the base of the triangle is placed over the frontal, occipital, or the temporal bones, as indicated by the injury to be dressed. I will give the fronto-occipital triangle: Place the base of the triangle to the frontal bone, allowing the apex to fall over the occiput; the two ends are carried backward

around the occiput and tied or pinned; the apex is then turned up and pinned to the body of the bandage.

Four-tailed Bandage.

This is a very useful bandage for fracture of the lower jaw and for dressing wounds of the scalp. For the jaw, a strip of bandage four inches wide and one yard long, is split from each end to within two inches of its center, applied, and two ends tied behind the neck, the other two on top of the head.

For dressing the scalp: Take a piece of muslin, one and one-fourth yards long and eight inches wide, split at both ends to within six inches of its center, apply over scalp, tie two tails behind the neck and two under the chin. The many-tailed bandage is used for holding dressings in abdominal wounds and to support the belly walls.

Many other bandages might be mentioned; but for special treatise on bandaging I refer you to some text-book on surgery, of which I know none better than that of Dennis.

Mammary Triangle.

Take a large square of cloth, or, better, gauze, and form a triangle; place the base of the triangle beneath the affected breast, and its apex over the shoulder of the affected side; carry one

end over the opposite shoulder and the other under the axilla of the affected side; tie the two ends at the back and secure the apex to the knot. This forms a good support to the mammary gland.

Gluteal Triangle.

First—tie a strip of roller bandage around the waist; then place the base of a triangle obliquely at the gluteal fold and tie the end in front of the thigh; carry the apex up under the strip around the waist; fold over and pin. It is employed for holding dressings to the gluteal region.

Sling for the Arm—Cervico-Brachial Triangle.

Place the base of the triangle at the wrist of the affected arm, carrying the proximal end next to the chest, over the sound shoulder, while the other end is passed over the affected shoulder and tied behind. Draw the apex back beyond the tip of the elbow-joint, fold over and pin.

The T-Bandage.

The T-bandage is a very important bandage, and is largely used in rectal work and gynecology for holding dressings in place after operations upon the rectum, vagina, perineum, and bladder. It is made by attaching a strip of roller bandage at right angles to another strip

of the same material; one strip being long enough to reach around the waist and tie, the remaining strip long enough to pass between the legs from behind, forward, and tie to the strip around the waist in front. A double T-bandage is formed by attaching two strips to the one forming the waist-band.

Flannel Rollers.

Flannel rollers are not used very much, but are sometimes employed as the primary bandage for holding the cotton in place until a plaster dressing is applied.

PLASTER DRESSINGS—APPLICATION OF.

As I have spoken already of the plaster dressing in the treatment of fractures, I shall not enter into extensive details here. It is important that we have good plaster bandages to secure a nice dressing. Bandages of cheesecloth, four to six inches wide and six yards long, are spread flat upon the table; and, with a spatula or caseknife, S. S. White's dental plaster is spread well into the meshes; after which, the bandages are lightly rolled, wrapped in paper, placed in an air-tight tin box and kept in a dry

place for use. At the time of use they are immersed in warm water until saturated, then taken out and applied. The bandage should not be reversed at any time, but torn off and smoothed down. If the operator thinks the bandage at any point needs strengthening, he can reinforce it by applying extra turns of the bandage or by rubbing on loose plaster from the vessel in which the bandages are soaked. The bandage may also be strengthened by working steel strips into the dressing as it is applied. The parts to be bandaged are well enveloped in cotton wool, which is held in place by a flannel roller loosely applied. Over this the plaster dressing is applied. It is good surgery to split the plaster dressing throughout its extent after slightly hardening, to guard against swelling. After splitting, it is held *in situ* with strips of roller bandage tied around the limb.

Plaster Jacket—Preparation of.

Phelps, of New York City, says that a plaster corset is the only treatment applicable to injuries of the back, either of congenital or acquired origin.

First, a snug-fitting cotton net undershirt is put on the patient, who is almost suspended by reaching an overhead pulley. The back is well-padded on each side of the spine with gauze

pads, to prevent the jacket from rubbing the processes of the vertebrae; then all the depressions are padded, nicely rounding the body. The body is then enveloped in several turns of a flannel bandage. Pads of gauze must be placed over the stomach (dinner pads) to allow space for the dilatation of the stomach after meals. When the padding is complete and the flannel rollers are in place, apply crinoline or cheese-cloth plaster bandages; eight or ten in number, six yards long and five inches wide, (smoothly applied,) are quite sufficient to make a good corset. The patient is taken down, laid on his side for the bandage to dry and for the arms and thighs to be trimmed around, permitting free movements. If the corset is to be removed, split down the front, before it dries, including everything, to skin, and slip it off at the patient's side. Tie a bandage around it, and place before the fire to bake. When it is replaced, keep it *in situ* with a few turns of the roller bandage, removing the dinner pads.

Other bandages will be spoken of in the connection in which they are used.

HEAD—OPERATIONS UPON.

Trephining.

This operation is demanded in fracture of the skull, abscesses and tumors of the brain; and, in fact, pressure of the brain from all causes. After an injury to the brain, there may ensue acute compression, either from the fractured skull, which is immediate; from hemorrhage, which comes on in a few hours, or from the formation of pus, appearing in a few days. Time permitting, shave the entire scalp, scrub with green soap and water, and envelope the scalp in a wet bichloride pack for a short time, that the epidermis may be loosened. When the patient has been anesthetized, remove the pack and scrub the head with soap and water a second time; then with ether, to be followed by the bichloride. A rubber tube, passed around the head, above the eyes and below the occiput, securely fastened, controls the hemorrhage. Make a trapdoor incision—following the wound, if there be one—in the scalp, down to the bone: the flap is turned back upon its hinge without the periosteum, which should not be stripped off the skull. If possible, the depressed portion of the skull must be elevated; otherwise, a button is removed from the edge of the sound bone,

either with the trephine, rongeur forceps, mallet and chisel, or Hey's saw. If the trephine is used, its bit is lowered, and set on the sound bone, one-fourth of an inch from its edge, avoiding the lateral sinuses and the meningeal arteries, and by a turning motion, a button of bone is removed. As soon as the trephine has cut a groove, the bit is raised, that it may not puncture the brain when the instrument cuts through. When the diploë is reached it often bleeds. The trephine should be removed occasionally and its grooves cleaned out with a toothpick. With the rongeur forceps, as much or as little bone as is desired, is bitten away. The thin blade is slipped beneath the skull and the instrument closed, biting away a small piece of bone; this being repeated, until as much bone as is required is removed. The mallet and chisel is too well understood to need comment, as also is the Hey saw. When paralysis follows fracture and depression of the skull, the opposite side of the body from which the injury is received, is paralyzed. Therefore, it is very necessary we should be familiar with the rules for locating the fissure of Rolando; as herein lies the center of motion, and here we must look for the clot, or tumor, which causes the paralysis. The fissure of Rolando can not be recognized by sight; therefore, we must find it by measurement. Draw a

line from the root of the nose (nasion), to the occipital protuberance (the inion); fifty-five one-hundredths of the distance of this line, measuring from the nasion, marks the upper end of the fissure of Rolando; in other words, one inch posterior to its middle. A second line, drawn from a point midway between the external angle of the eye and the auditory canal to a point one inch behind the middle of the first line, falls almost exactly over the fissure of Rolando. The centers of motion lie in reverse order from that which would appear natural to the casual observer. In the upper end of the fissure, lie the centers of motion which preside over the lower extremities; in its middle portion, lie the centers which preside over the arms and body; in its lower portion are the centers which control the motion of the head. After the removal of the bone, the dura mater is cut through with scissors, flaps retracted, clots turned out, and all bleeding points twisted or tied with fine catgut. If, after removal of a clot, oozing persists, apply a four-percent solution of cocaine on gauze, as a compress for a short time. If there is a tumor within one inch of the surface of the brain, as soon as the dura is cut through, it protrudes. A search with the butt end of a Hagadorn needle may be made for tumor of the brain; it can be introduced into the brain in several places to a depth

of two inches without danger. If pus is suspected, a search is made with a hypodermic needle. When all oozing has been checked, and the indications are favorable, the dura is closed with catgut sutures; in other cases, the treatment of the wound must be as indicated, either with or without drainage. The scalp is closed, in aseptic cases, with continuous catgut suture, without drainage. In abscess of the brain, the pus is freely evacuated, the cavity irrigated with salt solution and packed with sterile or iodoform gauze.

No attempt should be made to replace removed bone or to substitute celluloid plates in the space made vacant, as patients convalesce without interference.

Mastoid Operation (Wyle).

Indications for operation are local pain, heat, redness, swelling, and rise of bodily temperature. An incision is made by carrying the knife around, back of, and as close to the ear as possible; cutting to the bone throughout the entire length of the incision, which is one and one-half inches long. An operation carried even to this extent often relieves all symptoms; but, if after twenty-four hours, the symptoms have not subsided, proceed with the operation, by chiseling through the mastoid process in a direction downward, for-

ward, and inward, for one-half to three-fourths of an inch, parallel with the auditory canal. This opens the mastoid cells and liberates the pus. Irrigate with bichloride solution, pack with iodoform gauze, and remove the packing as often as necessary for cleanliness.

Frontal Sinus—Operation upon.

Indications for this operation are cold in the head, chill, and tenderness over the supra-orbital notch. Shave off the eyebrow and sterilize the field of operation. Make an incision from the root of the nose out over the supraorbital ridge, half an inch long, to the bone; turn the periosteum aside, and with the mallet and chisel a good-sized opening is made into the sinus. Irrigate with normal salt solution until all of the pus is washed out. Bend a silver probe and introduce into the opening, allowing it to find its way down through the nose, making an exit through the external meatus. A ligature is tied to the end of the probe and drawn up through the nose and frontal sinus, upon the withdrawal of the probe. To the ligature is tied a strip of sterile gauze, which is drawn through the nose and sinus and left for drainage. Remove the gauze and irrigate twice a day. Previous to removal of the gauze, tie a string to it, bringing it through the nose, that the next drain may be attached and drawn into place.

Antrum of Highmore—Operation upon.

Have the assistant elevate the patient's upper lip, and make an incision through the mucous membrane to the bone at the angle of the cheek, above the first bicuspid tooth. Scrape the periosteum aside, and with the mallet and chisel the antrum is gently opened. Irrigate the antrum freely with normal salt solution, pass in a strip of sterile gauze and leave for drainage. This operation is done for the evacuation of pus in the antrum. The diagnosis is aided by examining the patient in a dark room and placing an electric light in his mouth; thus enabling the surgeon to see the dark line to which the level of pus extends. If the entire cavity is dark, it is full.

Fifth Nerve, Second Division—Excision of.

This operation is demanded in cases of infra-orbital neuralgia, when other means for relief have failed. An incision is made from the side of the nose along the lower border of the orbit to the malar bone, and brought down over this bone to form the letter Y: the flap is dissected down, and the infraorbital foramen—through which the second division of the fifth nerve passes—is exposed. The flap is held aside with its underlying periosteum; and, with a mallet and chisel, a good portion of the bone is removed be-

neath the nerve, which is dissected back as far as possible, and a considerable section removed. The wound is closed with subcuticular sutures, dusted with iodoform, and dressed with sterile gauze, cotton and bandage.

Third Division of the Fifth Nerve—Excision of.

Medicinal means having failed, it is often necessary, in severe cases of *tie douloureux*, to remove a section of this nerve. Make an incision from a point just below the tip of the ear, extending downward along the rear border of the ramus of the jaw and along the lower border of the inferior maxilla, to near the facial artery. The incision is from one and one-half to two inches long. Dissect up the flap, including the periosteum, baring the ramus of the jaw; and, with the mallet and chisel, remove the outer plate of the ramus for one and one-half inches, exposing the nerve, which is the size of a knitting needle. Excise as long a section of the nerve as possible. Replace the flap, stitch the periosteum well into place, and close the wound with interrupted sutures; dress with sterile gauze, cotton and bandage.

Spinal Accessory Nerve—Excision of.

Place a pad beneath the patient's shoulders and turn the head to the opposite side. Make

an incision three inches in length along the anterior edge of the sternocleido-mastoid muscle, beginning at the mastoid process. Open the cervical fascia, relax the tissues of the neck, and draw the muscle outward and backward; the nerve will be seen crossing the transverse process of the atlas. It passes out from beneath the lower border of the digastric muscle. About half an inch of the nerve should be excised. This operation is sometimes demanded in spasmodic torticollis. The wound is closed and dressed antiseptically.

Tongue Excision of (Koker).

This operation is done for malignant growths of the tongue. It is often best to do a preliminary tracheotomy; although a better plan is to place the patient in the Trendelenberg position. Make an incision from the angle of the jaw, along its lower and under border to the symphysis menti, and extending along the median line of the neck to the pomum Adamii. Dissect the flap down, remove the sub-maxillary gland, and ligate the facial and lingual arteries. Pass a ligature through the tip of the tongue, and have the assistant draw it out through the wound; taking great care not to turn the tongue over, as in doing so, the operator may remove the unaffected side. With scissors,

cut straight from the tip of the tongue through the median line to its base, removing one-half of the tongue. If the entire organ is to be removed, the lingual arteries are ligated on both sides, and the tongue dissected out intact. This is comparatively a bloodless operation. When the cancer has so far advanced as to render hopeless the removal of the tongue, the life of the patient may be prolonged by ligating the lingual arteries and depriving the growth of much of its nutrition. If the tissues are so far invaded that the buccal cavity or the pharynx is involved, and the patient is suffering agony every time the tongue is moved, with dribbling of saliva, the lingual nerve should be divided by introducing within the mouth a curved sharp-pointed bistoury, and making a cut forward against the ramus of the jaw, extending from a point, three-quarters of an inch behind and below, the grinding surface of the last molar tooth. Wound closed with interrupted sutures, dusted with iodoform, and dry sterile gauze applied.

Nasal Hemorrhage—How to Control.

A search should be made for the bleeding point, which is always in the septum; and if found, touch it with the actual cautery. If this fail, use a four-per-cent. solution of cocaine, peroxide of hydrogen, or a saturated solution of

antipyrine on cotton and introduce into the nose. Another device for the control of nasal hemorrhage is to introduce a thin rubber bag into the nose and distend it with either air or water; or a square of gauze may be passed into the nose and packed with a narrow strip of gauze, forming an umbrella tampon.

If the above methods should fail, as they often do, then the nares is plugged both anteriorly and posteriorly. It is done as follows: an ordinary male soft rubber catheter is passed through the nostril on the affected side; when its point is seen in the pharynx, seize with a pair of forceps and draw it out of the mouth. *Secondly*, tie a double ligature, one yard long, to the end of the catheter and draw the string through the nose; detach the catheter and tie a tampon of cotton the size of the thumb, in the middle of the ligature, and with a sawing motion draw the tampon snugly into the posterior nares. If any difficulty should present, draw the soft palate forward with the index finger or a retractor, thus allowing the tampon to pass readily and snugly into place. Tie a single knot in the ligature close up in the external nares; this prevents spreading of the ligature and cutting of the nose. Place a cotton tampon between the two ends of the ligature close up against the nose and tie tightly; tie the two free ends of the ligature to-

gether, and leave in place for thirty-six hours. Before removing the tampons, a fresh, clean string is tied to the old one, and drawn through the nose, at the time of its removal and left in place for several hours, as hemorrhage may recur.

CERVICAL TRACT—OPERATIONS UPON.

Glottis, Œdema of—Operation for.

This is an affection, in which large dropsical bags, covered with mucous membrane, develop on either side at the top of the larynx, and nearly meet in the middle, obstructing respiration. It is an inflammatory distention of the arytaeno-epiglottic folds. With a curve-pointed bistoury, wrapped to within one-fourth of an inch of its point with cotton, and the index finger of the left hand passed back over the root of the tongue to the glottis, the knife is passed along the finger to the bags of water, which are freely split, giving immediate relief.

Sudden Choking—Laryngotomy in.

This sudden affection comes on when the patient is eating, and attempts to swallow while

talking and laughing. A morsel of solid food enters the larynx and is caught at the narrowest point, the chink of the glottis (*rima glottidis*). This requires prompt action. The patient's head is drawn back, and an incision is made through the depression between the *pomum Adamii* and the cricoid cartilage (crico-thyroid space). Guard the point of the knife with the thumb and finger, exposing one-quarter of an inch of the blade, and plunge it through with one thrust, cutting horizontally; this opens the crico-thyroid membrane, and we enter the free air space beneath. In making the horizontal incision, we get more room and avoid wounding the crico-thyroid artery; the patient breathes freely, and through the incision a lead pencil is passed, dislodging, upward, the food which has caused the trouble, after which the patient coughs it out. If the crico-thyroid artery is cut, it is easily controlled by the finger. Close the wound with a stitch; cover with a bit of rubber tissue and paint over with iodoform flexible collodion.

Tracheotomy.

An incision two inches long is made from the cricoid cartilage, down over the trachea, exposing the thyro-laryngeal fascia, which is cut transversely, pushed down, and released from the trachea, uncovering its first two rings. Remove

the retractors; and, with the knife guarded by the finger, to within one-fourth of an inch of its point, an incision, one inch long, is made from below, upward. Introduce an artery forceps, open the wound, and pass a fenestrated metal tracheotomy tube of medium size. The tubes must be of the same length, not too curved, and should be tied in with tapes passing around the patient's neck. In emergencies, a bit of rubber tube answers the purpose; or, the wound may be kept open by the introduction of a strong silk retraction suture in each side, tied behind the neck. Sterile gauze dressings are applied.

Œsophagotomy—External.

This operation is done for the removal of foreign bodies in the œsophagus. An incision is made similar to the one made in the ligation of the common carotid artery, the middle of which corresponds to a point, one inch below the pomum Adamii. As soon as the œsophagus is exposed, a male sound is passed through the mouth into it, pressing it forward into the wound. Cut down upon the end of the sound, introduce retractors and open the wound. Introduce a dressing forceps, seize and remove the foreign body. Close the wound in the œsophagus, with chromicised catgut sutures;

then close the external wound and dress antiseptically.

Intubation.

This operation is indicated when the patient's lips become cyanotic; and the intercostal spaces and stomach sink in during the act of inspiration. While the nurse holds the patient's feet between her knees, with the head resting upon her left shoulder, the operator places in the patient's mouth, between the teeth, either O'Dwyer's gag or a stout, notched cork.

The index finger of the left hand is passed into the patient's mouth, and back over the root of the tongue, until it comes in contact with the larynx or glottis; hold the finger in this position, while with the right hand the tube is passed down the side of the finger into the trachea. The tube is pushed off the introducer with the finger, and settled well into the trachea, before withdrawing the finger from the patient's mouth.

Removal of the tube may be effected in a number of ways. The O'Dwyer extractor has fallen into disrepute, as a consequence of its difficult application. Brown's finger extractor, passed into the throat and hooked into the loop of the tube, is the best. Dr. Wm. Cheatham, of this city, has devised a method of extracting the tube, as follows: The patient's head is lowered below the level of the body, and the

thumb placed over the trachea below the tube; with a milking process the tube is pushed up into the mouth and withdrawn with forceps. The Germans, instead of removing the string from the tube, fasten it between the teeth, or pass a soft catheter and draw it through the nose, fastening it to the cheek with adhesive plaster. When the tube must be removed, draw upon the string, and it readily comes away.

INTESTINAL TRACT—OPERATIONS UPON.

Gastrotomy.

This operation is demanded for the removal of foreign bodies, or tumors, from the stomach. An incision three inches long is made in the median line, over the stomach, exposing that organ to view. It is seized with forceps, drawn through the wound and incised, and the offending body grasped and removed. The wound is closed with catgut sutures. The abdominal wound is then closed in the usual way, and the wound dressed with dry sterile dressing, cotton and bandage.

Gastrostomy—(Frank).

This operation is demanded in stricture of the œsophagus, from whatever cause.

Make an incision, three inches in length, one inch below and parallel to the free border of the ribs on the left side ; and with forceps seize the end of the stomach, and draw it through the wound for three inches. Have the assistant to hold it while you proceed to stitch the peritoneal coat of the stomach to the peritoneum of the wound with Lembert sutures. An ordinary sewing needle is preferred for this work.

Make a second incision, one and one-half inches long, at the upper border of the lower rib, through the skin and superficial fascia to muscle. Pass a dressing forceps through this wound, and open it, separating the skin and superficial fascia from the muscles, down to the first incision ; with the forceps still *in situ*, seize the end of the stomach and draw it well through the top wound. Open the end of the stomach and stitch it securely to the skin with interrupted sutures ; generally eight are quite sufficient. The lower incision is then closed with a continuous suture, and painted with flexible iodoform collodion.

The patient is allowed semi-solid and liquid food, passed into the stomach, through a rub-

ber tube, which must be introduced three or four times per day to prevent contraction and healing of the wound. A soft rubber pad should be worn over the opening, and held in place by a band passing around the body, preventing irritation of the parts from contact with the clothing.

Cholecystenterostomy—Cholecystotomy.

This operation is demanded in cases of gall stones and occlusion of the ducts from any cause.

Make an incision, three inches long, parallel to and one inch below, the free border of the ribs on the right side over the gall bladder. When the peritoneal cavity is opened, introduce the index finger, elevate the lower border of the liver, and, with a pair of forceps, seize the end of the gall bladder and draw it into and through the wound. With an ordinary sewing needle run a purse-string suture completely around the gall bladder, one-half an inch from its end, and loosely tie the suture with a double first turn. Pack gauze pads closely and snugly around the gall bladder, and aspirate, removing as much bile as possible. Open the end of the gall bladder, remove the stones; introduce the finger and search them all out, and irrigate with normal salt solution. Examine the ducts, and if any ob-

struction is located, pass a needle through the side of the duct and dislodge it, if possible. Otherwise incise the duct and remove the foreign body—which is usually a stone. The female half of a small-sized Murphy button—previously prepared by the insertion of a long cork—is passed into the gall bladder, which is held up and open with three pairs of dissecting forceps. When the button is well below the line of the purse-string suture, it is tied tightly, and dropped into the peritoneal cavity. The highest portion of the small intestine is drawn out of the wound, and a purse-string suture run around a small space upon its side. The fæces are stripped out and the assistant seizes the gut, on each side of the point at which the opening is to be made, while the surgeon incises the gut and introduces the male half of the button and ties tightly. The corks are now withdrawn, the button securely locked and dropped into the peritoneal cavity. The abdominal wound is closed in the ordinary way and dressed antiseptically.

Cholecystotomy is often done instead of the above operation. When the gall bladder is opened—instead of using the button—the bladder is brought forward and stitched to the edges of the abdominal wound, with interrupted sutures. This, of course, establishes a temporary fistula, which generally closes in six to eight weeks,

provided all of the stones have been removed from the gall bladder. A rubber drainage tube is left in, secured by a safety pin, for ten days, and a pad of sterile gauze, cotton and bandage, is worn over the opening to absorb the discharge.

Gastrectomy — Done for Malignant Growths.

The complete extirpation of the stomach is seldom attended with success. It is advisable, however, to be familiar with its technique. An incision, six inches in length, is made in the median line over the stomach, and the mesentery of the stomach, ligated in sections, and cut loose until the stomach is free, save at its cardiac and pyloric extremities. The cardiac end of the stomach is cut loose from the œsophagus, and all bleeding points checked. The pyloric end is then severed from the pylorus, and the end of duodenum brought up, and sewed to the end of the œsophagus with interrupted sutures of cat-gut. The wound is closed in the usual way, and a sterile dressing applied.

Pylorectomy.

This operation is done for stricture of the pyloric end of the stomach, either from cancer or otherwise. An incision four inches long is made, in the median line, over the stomach, and,

if necessary, it may be extended in any direction to suit the convenience of the operator. As soon as the tumor is exposed, gauze pads should be well packed around it to absorb any escaping discharge. If adhesions are very extensive, it may be impossible to complete the operation. The incision must be large enough to allow free access to the tumor. When the extent of the tumor is well defined and the gauze packing in place, the diseased portion of the pyloric end of the stomach and the upper end of the duodenum are excised; the stomach and duodenum should be held firmly between the fingers of the assistant, to prevent leakage, and the growth excised half an inch clear of the diseased tissue. Hemorrhage is controlled with the artery forceps or hysterectomy clamps. The open ends of the stomach and the duodenum are temporarily packed with gauze, though this is not essential. Separation of the mass from its posterior attachment must be done with great care to prevent wounding the inferior vena cava, the abdominal aorta, or the celiac axis. The bleeding points are secured as cut. All bleeding having been checked, the open ends of the stomach and duodenum are fitted and fastened together by means of sutures. If gauze packing has been used in the stomach and duodenum, it must be removed before the suturing is completed. If the opening in the

stomach is very much larger than that of the duodenum, it must be reduced by plastic cuts to fit, and suture. The best suture here is the interrupted Lembert. The line of suture is covered with strips of gauze packed in, one end of which is left out of the abdominal wound. It is removed in two or three days, and the wound closed. Dress as usual. Rectal feeding should be resorted to for several days.

Instead of pylorectomy, gastroenterostomy is often done, and especially when pylorectomy can not be performed. This operation should be performed through a median incision, six inches in length, over the stomach. If possible, both the stomach and the jejunum should be drawn out through the abdominal wound, and an incision two inches long is made in both the stomach and the jejunum. The edges of the openings are then sutured completely around with interrupted catgut sutures one-sixteenth of an inch apart, until the entire circumference of both openings have been sutured (Sonnenberg's method). To the edges of the incision in the stomach catgut sutures with long ends are fastened. They are then passed through the jejunal opening and brought out through another opening, made a short distance further in the intestine. Traction on these sutures brings the jejunum into close apposition with the opening

in the stomach, where it is securely fastened with catgut sutures through the peritoneum. This method is very similar to Maunsell's suture of the intestines. For additional security a second row of sutures may be employed. The opening in the intestine is then closed with Lembert sutures. Another method—and I think a better one—is to divide the jejunum and unite its lower end directly to the stomach, invaginating and permanently closing the upper end. This anastomosis may be greatly facilitated by the use of a potato cylinder of sufficient size to completely fill the end of the severed bowel and the gastric incision. After suturing, the cylinder may be left *in situ* or crushed, at the discretion of the surgeon; the former of which, I personally prefer, as it soon becomes flaccid and collapsed.

Gastrorraphy.

This operation is demanded in dilatation of the stomach. A median incision, six inches long, is made over the stomach, and that organ brought out through the abdominal wound. A plait is folded into the stomach and the peritoneal surfaces sewed in such a manner as to retain it. Weir—in one of the few reported cases—employed a double plait, this proving successful.

Intestinal Anastomosis, End to End (Maunsell).

In this, as in all anastomosis, a median incision is made and the peritoneal cavity packed with gauze. The bowel is then stripped and tied off with strips of gauze; after which, the section of bowel is removed, along with a V-shaped piece of the mesentery. The ends of the bowel are irrigated with normal salt solution and wiped dry with sterile gauze. The mesenteric junctions are securely closed one-fourth of an inch from the severed ends of the bowel, tied snugly, and the end of the suture left sufficiently long for a guy string. A similar suture is introduced in the extreme edges of the ends of the bowel and tied. A slit one inch long is made two inches from the end of the severed gut, through which a pair of forceps is passed, seizing the two guy strings, and withdrawn, thus invaginating the gut. The guy strings are held tightly enough by an assistant to put the bowel on the stretch; and, with an ordinary needle, armed with fine silk thread, the four layers of the bowel are sewed through and through. It is best to cut the sutures in the middle and tie them as they are introduced. When the suturing is completed, detach the guy strings, draw the gut out straight, close the slit with Lembert sutures, and remove the gauze pads and strips

from the abdominal cavity. Draw the great omentum down and close the abdominal wound according to Richelot's technique. Dust with iodoform and dress with gauze, cotton and bandage.

Intestinal Anastomosis, End to End—(Murphy Button).

Open the belly, withdraw the bowel and pack the peritoneal cavity with sterile gauze pads. The bowel is stripped, tied off, excised and irrigated, as in the foregoing operations. With an ordinary needle armed with a fine silk thread a purse-string suture is carried completely around the bowel, one-third of an inch from the ends, and tied loosely with a double first turn; seize one end of the gut with a pair of forceps, distend the bowel and pass the female half of the button, previously corked: tie tightly and drop into the peritoneal cavity. The opposite end of the gut is treated in a similar manner. The corks are removed and the button securely locked; after which, the incision in the mesentery is closed with a continuous catgut suture. The bowel is dropped back into the abdominal cavity, the great omentum drawn well down and the abdominal wound closed according to Richelot's method. Dress as usual.

There are serious disadvantages in the use of the Murphy button. It may become occluded,

causing the death of the patient, or it may remain in the alimentary canal, showing no tendency to come away, as in a case shown me by my friend, Dr. John A. Wyeth, of New York City. The button remained in the belly 127 days, and was removed by abdominal section. Dr. Abbe reports a similar case, the patient dying from the effects of a laparotomy, for removal of the button.

Intestines, Anastamosis of, End to End—(Johnson).

This operation was devised by the author, and is regarded by him as the best, easiest and safest of all methods yet devised. Make a median incision six inches in length, and draw the bowel out through the abdominal wound, and cover with warm, moist, sterile gauze; pack the abdominal cavity with gauze pads. Strip the intestine, between the finger and thumb, of faeces, and tie off with strips of sterile gauze passed through the mesentery three inches from the bowel, and far enough from the point of excision to allow room for the anastomosis, tying with a slip knot. Cut out the section to be removed, including a V-shaped piece, from the mesentery, and irrigate the ends of the bowel with a normal salt solution, and wipe dry with sterile gauze. Close the mesenteric junction of both ends of

the bowel with fine silk sutures, and introduce a cylinder made of a potato, carrot, beet; or, in fact, any vegetable from which a cylinder of sufficient size to fill the calibre of the gut operated upon can be made, two inches in length into one end of the severed bowel. As the cylinder enters, the bowel is sufficiently invaginated to bring peritoneum in contact with peritoneum of the opposite end of the gut, treated in a similar manner upon the other end of the cylinder. This, being well in place, is seized between the thumb and index finger of the left hand and held steadily; while, with an ordinary cambric needle armed with fine silk thread, sutures are introduced one-sixteenth of an inch apart, until the entire circumference of the gut is approximated; after which, the wound in the mesentery is closed with continuous sutures. Great care should be exercised in closing the mesenteric junctions; as, herein lies the great danger of leakage, sepsis, and death. The sutures, in the bowel, should extend through the serous and muscular coats. The cylinder is left *in situ*, as it does not interfere with union or the passage of the fæces. Being of vegetable composition, it is readily digested to a sufficient extent to allow of its passage down the alimentary canal without giving notice of its movements.

This technique is in every way preferable to the Murphy button or Maunsell's operation, as it gives no trouble after the operation. The gauze pads are removed from the abdominal cavity, the tapes removed, the bowel dropped back, and much care taken to draw the great omentum well down over the bowels. The abdominal wound is closed after the method of Richelot, of Paris: a catgut suture is passed through the peritoneum, at the upper end of the wound, and tied, leaving the end of the suture long. The peritoneum is closed with a continuation of this suture until the lower end of the wound is reached, when it is carried through the recti muscles, which are approximated by a continuous suture to the upper angle of the wound, and tied. The skin and superficial fascia are closed with silkworm gut sutures, and dressed with sterile gauze, cotton and bandage.

Gunshot and Stab Wounds of Intestines—Treatment of.

Gunshot and stab wounds of the abdomen should never be probed ; but, instead, the wound is at once enlarged and the injury repaired. If the wound is near the median line, cut through it, otherwise do a laparotomy in the median line. If in emergency cases, away from hospital conveniences, prepare several gallons of boiling

normal salt solution 5i : Oj—and boil towels, cotton cloths, and, in fact, everything to be used in the operation. The instruments and sutures are boiled in a soda solution. With everything in readiness, a long, free incision is made, the bowels turned out and covered with hot towels. The bowel should be tied loosely—to mark the starting point—with a white thread, and a close search made for wounds, which are rendered as nearly sterile as possible and repaired as rapidly as found. When the bowel has been examined throughout its course, a black thread is tied loosely around it and the bowel thoroughly searched back to the starting point, marked by the white thread. Dr. W. T. Bull, of New York, says : “ We should not be content with *one* examination of the intestines, but only after repeated attempts—failing to find wounds—should we return the bowels to the abdominal cavity.”

In small bullet or stab wounds of the intestines, a silk purse-string suture is carried completely around the wound, its edges turned into the bowel and tied, cutting the ends of the suture very short. All intestinal wounds of a similar character may be treated in this manner. If the wounds are large—including one-fourth to one-third of the caliber of the gut—they should be closed with interrupted Lembert sutures. If

the intestinal wounds are incised they should be closed with the Halsted stitch. This is made by passing the needle through the peritoneal coat of the bowel, on one side of the wound, crossing over and making a similar stitch on the opposite side. These sutures should be one-sixteenth of an inch apart, and should all be introduced before any are tied. If one-half or more of the caliber of the gut is destroyed, a resection of the injured part is demanded, and an end-to-end anastomosis should be done according to the author's technique.

If the mesentery is wounded, tie or twist the bleeding vessels and close the wound with a continuous Lembert suture; but if the wound is close to the bowel and interferes with the circulation sew the mesentery to the gut on both sides with Lembert sutures.

After intestinal operations everything must be wiped perfectly dry with sterile gauze before the bowels are returned to the abdominal cavity. The peritoneal cavity should never be irrigated if avoidable; but if it becomes necessary, use gallons of normal salt solution, and irrigate thoroughly. The water should be hot as can be borne comfortably by the hand. It is a good plan to leave one quart of the solution in the peritoneal cavity to float the bowels into position and prevent adhesions. It is utterly im-

possible to thoroughly cleanse the wounded bowels without turning them out of the abdominal cavity. In consequence of this they become swollen and distended with gas. Place a hot sterile towel over them, tuck it into the peritoneal cavity and press them back. Should this procedure fail, several punctures with the hypodermic needle should be made, allowing the gas to escape. After returning the bowels draw the mesentery down over them, as this prevents adhesion to the abdominal wound. When operating upon the bowels, if you suspect the parts are dead, apply Nothnagle's test by touching a crystal of rock salt to the suspected part; if alive, reverse peristalsis is immediately produced. Another test is to squeeze the parts between the finger and thumb, observing if the blood returns when released. Still another plan is to anchor the bowel in the peritoneal cavity fifteen minutes and see if the circulation is re-established. If the gut is dead, and the collapse of the patient seems imminent, establish an artificial anus and wait until the patient regains strength before doing a resection. Remove the marking threads before returning the bowels to the abdominal cavity. Close the belly and dress in the usual manner.

Colotomy, Inguinal—(Goodsall).

This operation is demanded in stricture or occlusion of the rectum, malignant or otherwise. The bowels should not be emptied before doing this operation. Make an incision, two inches long, one inch to the inner side of the anterior-superior spine of the left ilium, through the skin, superficial fascia, and the aponeurosis of the external oblique muscle.

The fibers of the internal oblique and transversalis muscles are then bluntly separated with the fingers down on the peritoneum, which is seized with thumb forceps, drawn into the wound and opened. A flat sponge, with a string attached, is introduced into the peritoneal cavity to prevent protrusion of the bowel or omentum, after which, the peritoneum is stitched to the skin all the way around the wound. The angles of the skin wound are then closed up to the peritoneal opening. The sutures are left long, serving as retractors to hold the wound open. The sponge is now withdrawn, and that part of the descending colon, at its forward and downward portion, is seized with the finger and drawn through the wound to the extent of two inches. It is recognized by its longitudinal bands, sacculated walls and epiploicæ. A strong silk suture is passed through the skin of the

belly, one inch to the inner side of the wound ; the needle is then carried through the mesentery, one-fourth of an inch from the gut, and returned in such a manner that a small portion of the mesentery is included in the suture, and securely tied. This anchors the knuckle of gut to the abdominal wound. A strong silk suture is now passed through the knuckle of bowel, both at the upper and the lower ends of the wound, and then through the skin of the belly. Iodoform gauze is packed well around and beneath the knuckle of the gut, which is opened by a transverse cut with the scissors, and the sutures securely tied, drawing the wound in the bowel open. All bleeding points are tied, and the omental tags, if large, ligated and cut off.

The wound, in this operation, should be as small as possible, as it gradually grows larger. The dressing consists of oxide zinc ointment, on a linen cloth, over which, is applied cotton and bandage. There is frequently suppuration, but the patient is generally well in three weeks. The patient, soon after the operation, is given gtts. xv. of tr. opii, then v. gtts. every four to six hours—as indicated. The patient is allowed no food or drink for twelve hours; on the second day, $\mathcal{O}j$ of milk with $\mathcal{O}j$ of water, is permitted at intervals during the day; on the third day this amount may be doubled. The wound should be

examined every four hours, beginning on the morning after the operation. If constipation occurs knead the transverse colon. This often causes the faeces to pass at once. If the faeces are hard, introduce the finger into the colon and remove the hard lumps. Should gas accumulate, pass the finger, or, better, a piece of rubber tubing, into the colon, allowing it to escape. The posterior wall of the gut projects forward, forming a spur, thus preventing the escape of the faeces down the bowel, and causing them to pass forward and out of the wound, or artificial anus. The bowels should not be moved for eight days; as, by this time, perfect union will have taken place, and peritoneal infection can not occur. The constant discharge of faeces is controlled by a rubber ring fastened to a belt passing around the body. The artificial anus is covered with cotton, the ring placed over it, and the belt buckled. Inguinal colotomy is to be preferred to the lumbar, as it is easier for the patient to care for.

During a personal interview with Mr. D. H. Goodsall, of St. Mark's Hospital, London, I was informed that he had done this operation many times, with one hundred per cent of recoveries, accompanied by the most gratifying results. Having seen him perform a number of these

operations, I am convinced that this method of colotomy is to be preferred.

Colotomy—Lumbar.

Place the patient in the right, semi-prone, position, and make an incision, two and one-half inches in length, one inch above the posterior-superior spine of the left ilium down to the peritoneum. The remaining steps in the operation are identical with those of inguinal colotomy—the after-treatment being the same.

NEPHRECTOMY.

Abdominal.

Make an incision, midway between the anterior-superior spine of the ilium and the umbilicus, extending from the lower border of the ribs to a point corresponding to the superior spine of the ilium into the peritoneal cavity. Turn the patient slightly upon the opposite side from that upon which the operation is being performed, allowing the bowels, by force of gravity, to fall from the field of operation. The bowels are now packed well out of the way with hot sterile gauze, the posterior wall of the peritoneum incised, and, with the fingers, the kidney is

detached from the capsule and brought out through the wound.

The kidney is held well up, and a double ligature passed through its attachment, about half an inch below its hilum : twist the ligature upon itself and tie both sides, finally carrying the ligature completely around the pedicle and tie as a whole. Then, with scissors, the kidney is cut loose, and the stump cauterized before dropping back into the abdominal cavity. Pass a dressing forceps into and through the posterior part of the wound to the skin, and cut down upon its point, allowing it to pass through. Upon the withdrawal of the forceps a strip of iodoform gauze is drawn through the wound, establishing posterior drainage. Close the cut in the posterior wall of the peritoneum, thus rendering the wound extra-peritoneal. Remove the gauze from the peritoneal cavity, and close the belly in the usual way. Dressing—iodoform, gauze, cotton and bandage.

Nephrectomy—Lumbar.

Place the patient on his side, with the legs flexed, and a small sandbag underneath, making the side to be operated upon tense and prominent. An incision is made two and one-half inches from the spine along the outer border of the lumbar muscle, extending from the superior crest

of the ilium to the ribs. If, in the course of the operation, it is found that the kidney can not be removed through this opening, employ Kœnig's technique by making a horizontal incision extending from the first incision as far forward as the umbilicus, if necessary. Have the assistant place his hand beneath the patient's abdomen, and press the kidney up into the wound. Incise the capsule, and draw the kidney out of the wound. Pass a double ligature through the attachment, half an inch from the kidney, and tie on both sides. Then carry the ligature around the pedicle and tie as a whole. Cut the kidney loose with scissors, touch the stump with the cautery and drop back. If obstruction of the ureter is suspected, open it, pass a catheter into the bladder, withdraw it, and close the wound with catgut sutures. Through this incision both nephroraphy and nephrotomy can be done. The first is done for anchoring the floating kidney to the muscles of the back with sutures, or suspending it to the last rib with a silver suture. The second, or nephrotomy, is simply opening the kidney and removing any foreign substance which may be found. If pus is found in the kidney, it must be drained posteriorly in all cases.

Before doing a nephrectomy, it is advised by some surgeons to do suprapubic cystotomy, collecting the urine from each ureter separately,

and in this way ascertaining which kidney is affected. This is accomplished by alternately pressing a tampon of cotton over the mouths of the ureters. Close the wound with both buried and superficial sutures, leaving a strip of iodoform gauze in for drainage. Dry sterile dressing, cotton and bandage are applied.

APPENDICITIS — OPERATION FOR.

McBurney, of New York City, says: "All well-defined cases of recurrent appendicitis should be operated upon in the quiescent state, and every operation must be suited to the case to be operated upon." Symptoms demanding this operation are as follows: *Firstly*, rigidity of the right side of the belly wall: *Secondly*, the thigh is slightly flexed: *Thirdly*, there is generally a tumor in the right side of the abdomen: *Fourthly*, great pain on extending the leg: *Fifthly*, the bowels are constipated: *Sixthly*, may be temperature with rigors, though the temperature is often subnormal, with anxious facial expression: *Seventhly*, rapid pulse and respiration. Inflammation of the appendix begins in the appendix itself, and is not due to seeds of fruits, but to faecal concretions.

Dr. McBurney says: "Every chronic case of appendicitis is, under favorable circumstances, operable." Dr. John A. Wyeth affirms that "one-half as many more cases treated surgically recover than those treated medicinally."

In suspected cases of appendicitis—It is clear that, in some cases, the symptoms are so grave, no time should be delayed in doing the operation. If the pulse and temperature are high, with persistent vomiting, delay can not be considered. A sallow coloring of the patient, with an extension of the tenderness over the belly, and an ill-defined pain in the usual locality, are evidences of a dangerous sepsis. Thirty-six hours after an attack, if there are no well-marked signs of abatement of the symptoms, an operation should be done, as at this time it can be made radical. It is much better to operate too soon than too late. On the other hand, if the symptoms have subsided, and the patient is convalescent, wait until the symptoms have disappeared, and operate during the quiescent stage, thus avoiding another attack.

The technique of the operation is as follows: Draw a line from the anterior-superior spinous process of the ilium to the umbilicus, and make an incision three inches long, beginning one inch above the line drawn and extending two inches below. The incision should be two inches to the

inside of the crest of the ilium: the point at which it crosses the line is known as McBurney's point; or make an incision three inches in length and two-fifths of the distance from the anterior-superior spinous process of the ilium to the umbilicus, obliquely downward and inward, through skin and superficial fascia, exposing the fibers of the external oblique muscle. Separate bluntly the fibers of the external oblique and retract them. The fibers of the internal oblique and those of the transversalis muscles are also separated. These muscles are well retracted with four retractors: the peritoneum picked up with thumb forceps, drawn into the wound and opened transversely, the finger introduced and a search made for the appendix. When found, it must not be torn from its adhesions roughly: but, if necessary, the wound is enlarged and a free dissection made. The best guide to the appendix is to follow any one of the three longitudinal bands of the cæcum, either of which leads directly to it. Should much difficulty be experienced in finding the appendix, turn the patient slightly on the left side, causing the contents of the abdomen to fall out of the way, while the cæcum and appendix will be found to the outside, near the ilium, rarely toward the median line. When the appendix is found, gauze is packed well around it, to absorb

any discharge that might escape during the operation. Unless pus has formed, break up the adhesions, withdraw the appendix and ligate its mesentery in sections, and cut it loose, leaving the appendix free. About one-half of the appendices have little or no mesentery. With the bowels held well out of the way, and the gauze previously applied, an assistant holds the appendix up, while the surgeon runs a purse-string silk suture completely around its base, half an inch down on the cæcum. The suture is tied loosely with a double first turn, having the assistant hold the base of the appendix between the thumb and finger, thus preventing the escape of fæces. The appendix is cut off, leaving a stump half an inch in length; twist all bleeding points and cleanse the stump. It may be cauterized, if preferred. An anatomical forceps is passed into the appendix and opened, relieving any stricture that may be present. With another forceps the edge of the stump is seized and carried into the cæcum, thus invaginating it. The loosely-tied suture is then tied tightly, as the forceps is withdrawn, closing off the appendix from the peritoneal cavity.

Close the peritoneum and muscles with catgut sutures; for the skin and superficial fascia, silk-worm gut is best.

The above technique is not applicable in suppurative cases, as under such circumstances, a free incision is made through the belly wall to the appendix. If suppuration and adhesions are extensive, no attempt should be made to remove the appendix; but the pus is freely evacuated and the pus cavity thoroughly cleansed with dry sterile gauze. If irrigation is resorted to, it must be of normal salt solution. The cavity is packed with iodoform gauze. The dressings must be renewed every two days; each succeeding dressing requires less packing if the patient's convalescence is progressive.

At each dressing, the cavity should be mopped out with moist sterile gauze, and irrigated with normal salt solution. When the wound has filled, and the skin only remains unhealed, trim its edges and close with sutures. In some cases the cavity may be irrigated with peroxide of hydrogen, to which a pinch of soda bicarb. has been added, relieving its acidity. If the abscess ruptures into the peritoneal cavity and floods it with pus, make a long free incision, turn out the bowels and wash them, also the abdominal and pelvic cavities, freely with gallons of warm normal salt solution, keeping hot towels over them during the time. The hand is passed into the abdominal cavity and every sulcus and depression thoroughly cleansed.

The after-treatment of these cases is difficult and requires the constant vigilance of the surgeon. Strips of iodoform gauze are placed in the peritoneal cavity, in all directions simulating the spread hand, each one of which should emerge from the external wound. These serve as an efficient drain, and should not be removed, if any force is required, as they may become adherent and remain in the peritoneal cavity, for several weeks.

If in examining a case, the surgeon is in doubt as to at what point the tumor is adhered to the abdominal wall; a median incision should be made; the finger introduced and the adhesion located; measure the distance from the edge of the wound to the point of attachment. Close the wound and seal it with iodoform collodion, before opening into the abscess over point of attachment. The cavity is irrigated, if thought necessary, with normal salt-solution, or peroxide of hydrogen, wiped dry and packed with iodoform gauze. Dress with sterile gauze, cotton and bandage. The dressings are changed and the wound thoroughly cleansed twice a day, if the amount of the discharge demands it.

HERNIOTOMY—(BASSINI).

This operation is preferred by the majority of surgeons: *Firstly*, make an incision from the spine of the pubis, one inch to the inner side of, and parallel to, Poupart's ligament, from four to six inches in length, through the skin and superficial fascia to the aponeurosis of the external oblique muscle; and with the fingers, bluntly dissect the skin and fascia back, exposing the external oblique muscle, and external abdominal ring: *Secondly*, pass a grooved director through the external abdominal ring, just beneath the aponeurosis of the external oblique muscle, and split it up for three inches, exposing the cord, sack, and the edges of the internal oblique, and transversalis muscles, which unite and form the conjoined tendon. The arching fibers of these muscles pass over the cord and form the deep ring: *Thirdly*, dissect the aponeurosis of the external oblique freely loose, with the fingers, from the internal oblique muscle. Have the assistant retract the edges of the wound, well, including the aponeurosis of the external oblique. Pass the finger beneath the cord and sac, and separate them *en masse*, freely loose from the canal: *Fourthly*, dissect the sac loose from the cord, beginning at the upper end. This

dissection is very much facilitated by holding the parts between the operator and the light, thus enabling the surgeon to separate the sac from the cord to a much better advantage. When the fingers are worked between the sac and the cord, the remainder of the separation is comparatively easy. I have repeatedly been compelled to open the sac, before I could separate it from the cord, so obscure was their union: *Fifthly*, the conjoined tendon is bluntly dissected loose with the fingers, from the peritoneum and surrounding parts, so that its edge will lap freely over Poupart's ligament; this relieves the tension: *Sixthly*, the sac must be opened in all cases. If it contains omentum, it is ligated in sections, high up and cut off. If it contains the bowel, it must be returned to the abdominal cavity and the sac ligated very high up, over the end of the finger, in the sac, to prevent tying off a knuckle of gut. The sac is cut off to the distal side of the ligature and dropped back into the peritoneal cavity. The purse-string suture is employed by Gerster, of New York City. It is carried completely around the upper end of the sac, and tied off, over the end of the finger. The sac is then cut off to the distal side of the ligature and dropped back. This prevents sloughing, as portions of the sac are not included in the ligature: *Seventhly*, after having trimmed off the fat from

the edges of the conjoined tendon, a strip of sterile gauze is passed beneath the cord, which is held aside by an assistant. Sutures of either kangaroo tendon or chromicised catgut, five or six in number, are introduced from within, outward, before any of them are tied. A curved needle, armed with the suture, is passed three-fourths of an inch from the edge of, and through the conjoined tendon, from above, downward. Then, guarding the femoral vessels with the fingers of the left hand, the needle is passed through the deep tense portion of Poupart's ligament. The sutures should be only one-fourth of an inch apart, and should be tied only tight enough to perfectly coaptate the parts. Great care is taken not to constrict the cord at its upper end: *Eighthly*, place upon this newly formed, rear wall, the cord, and over it sew with continuous catgut suture the aponeurosis of the external oblique, taking care not to constrict the cord at the lower end: *Ninthly*, the skin is closed with continuous or interrupted sutures, as the surgeon prefers: the scar painted over with iodoform collodion, and dressed with a dry, sterile dressing of gauze, cotton, and bandage. Apply tightly and allow the dressing to remain ten days, unless complications arise, demanding its removal. The patient should remain in bed four weeks, and should be ordered to support the

scar with the hand when coughing or straining from any cause. Bassini, the originator of this operation, uses silk sutures throughout.

Herniotomy—(Halstead).

This operation is somewhat different from Bassini's, in that the incision extends from the external abdominal ring to within one inch of the anterior-superior spine of the ilium. The aponeurosis of the external oblique muscle is split up on the grooved director, the full length of the skin incision. The internal oblique, the transversalis muscle and fascia are cut through, from the external abdominal ring, to a point about three-fourths of an inch above the internal ring. The vas deferens and the blood vessels are carefully separated from the sac. All, excepting one or two, of the veins of the cord are excised. The sac is opened and its contents replaced, and held in place with pads of gauze. The peritoneum is closed with either mattress or continuous sutures of fine catgut; the sac is cut off close to the sutures; the gauze pads are all removed before closing the peritoneum. The cord, in its reduced state, is raised out of the wound with strips of sterile gauze passed beneath it, and held during the introduction of the six or more mattress sutures necessary for the closure of the wound. The sutures pass through

the external and internal oblique muscles, the transversalis muscle and transversalis fascia on the inside, from above, downward, and cross over to the outside, and pass from below, upward, and emerge through Poupart's ligament and some fibers of the external oblique muscle. The two outermost sutures pass through the same tissue on both sides of the wound; these are the *most important* of the deep sutures, as the newly transplanted cord passes out between them. If they are placed too close, the circulation of the cord will be interfered with. If too far apart, hernia may follow. If the abdominal muscles are very thin, the cord is brought out, higher up, by dividing them with the knife. The cord is placed upon the aponeurosis of the external oblique muscle, and the skin closed with a sub-cuticular suture, though the continuous or the interrupted suture may be used with good results. Dressing: — gauze, cotton and bandage.

Herniotomy—(Macewen).

An incision, four inches in length, is made over the inguinal canal down to the aponeurosis of the external oblique muscle, exposing the sac and cord at the external abdominal ring. The sac is dissected loose from the cord, well up to and within the abdominal ring, allowing the finger to sweep freely around the neck of

the sac, and dissect it loose from the belly wall for one inch. The sac is now opened at its lower end, and any omentum which may need removing is ligated in sections and cut off, and the stump returned to the abdominal cavity, along with the entire contents of the sac. The aperture which has been made in the sac is closed with fine catgut sutures; and a curved needle, armed with a strong catgut suture, with a knot tied on its end is introduced through the lower end of the sac, from behind forward: *Secondly*, from before, backward, through its middle: *Thirdly*, from behind, forward, at its neck, high up, and continued through the muscular wall of the belly, including the transversalis fascia and muscle, the internal and external oblique muscles and the skin. Tension is made upon the suture, drawing the sac well up into the internal abdominal ring, where it is anchored by taking a stitch in the skin and securely tying; or the suture may be tied on the fibers of the external oblique muscle. Care must be taken that the sac is not twisted during the introduction of the sutures.

A catgut suture is passed through the conjoined tendon, from before, backward, passed along its posterior wall for one inch, and brought through the tendon from behind, forward. The needle, which is a blunt curved one, is passed through Poupart's ligament—carrying the suture

with it. The needle is unthreaded and withdrawn, leaving the suture *in situ*. The other end of the suture is carried through Poupart's ligament in the same manner. The suture is tied only tightly enough to accurately approximate the conjoined tendon to Poupart's ligament: and not so tightly as to pucker the parts. If other sutures are required, they are introduced in a similar manner. In a conversation with Macewen, during my attendance at his clinics, he remarked that it was a matter of taste as to the form of suture used, adding with pardonable pride, that his proportion of recurrences was about four in a hundred.

Dr. Macewen cited a number of cases upon which he had operated among iron-workers. The hernias were of enormous size, and had withstood the strain of heavy lifting for four years. This would seem, to a rational mind, sufficient proof of the results of herniotomy properly performed. In this operation, you observe that not a single fiber of the external oblique muscle has been cut; therefore the normal strength of the belly wall is maintained.

Close the wound and dress with sterile gauze, cotton and bandage.

Herniotomy Femoral - Bassini.

Make an incision, parallel with Poupart's ligament, and over the center of the tumor; then dissect the sac freely loose from the canal, and ligate it over the end of the finger as high up as possible. With a curved needle, armed with a silk thread, sutures are inserted in such a manner as to unite Poupart's ligament with the pectinaeal fascia, the first one being introduced near the spine of the pubis; the second, one-eighth of an inch externally; and the third, one-fourth of an inch from the femoral vein. These sutures are left untied until the rest have been passed; first, through the edge of the falciform fascia; then through the pectinaeal fascia, the lower suture entering just above the saphenous vein. The upper sutures are now tied, drawing Poupart's ligament back to the pectinaeal line; the other sutures, bringing together the anterior and posterior walls of the canal, are then tied. The skin is closed, with continuous or interrupted sutures, without drainage. Bassini has done this operation many times without a single death or relapse.

Herniotomy — Umbilical.

In infants or children under ten years of age palliative treatment, in the vast majority of cases, is to be preferred. A flat wooden button, cov-

ered with cloth, placed on the hernial opening and confined by a strip of rubber plaster, passing around the body, which is renewed every ten days, is the best mode of treatment. The patient is generally relieved in a few months, although some cases require one year's treatment, and may then be uncured.

If a child reaches puberty without relief from judicious treatment, then an operation for radical cure is justifiable. The operation recommended is excision of the umbilicus (omphalectomy) and suturing in separate layers the muscles and fascia of the belly wall with chromicised catgut, that firm union may take place before the sutures are absorbed. The skin is closed with silkworm gut and without drainage. In adults the prognosis is unfavorable, as the affection in many cases recurs: though the best mode of operation is to remove, by an elliptical incision, the umbilicus and superfluous skin and sac. This operation should in all cases be undertaken before adhesions have taken place, and while the hernia is reducible. When the peritoneum is opened the bowels are packed away with sterile gauze, all adhesions are broken up, and the belly closed in the usual manner.

The wound is dusted with iodoform, covered with gauze, tightly strapped with adhesive plaster and covered with cotton and bandage.

Irreducible umbilical hernias are, as a general rule, inoperable, and should be left alone, except in selected cases, with hard, thin abdominal walls. All other forms of hernia are dealt with according to the nature of the case.

GENITO-URINARY ORGANS— OPERATIONS UPON.

Circumcision.

After having marked the foreskin with iodine one-fourth of an inch in front of the corona, a rubber catheter is placed tightly around the base of the penis and secured with forceps, to control the circulation. Then a four-per-cent. solution of cocaine is injected and a dorsal slit made with scissors. The skin is then trimmed off, corresponding to the line made by the iodine, to near the frenum on both sides. This is left to be excised after the catgut sutures have all been introduced and tied. During the introduction of the sutures this strip of skin is held steady with forceps. The sutures are of catgut, interrupted, tied snugly, and both ends left long. A strip of iodoform gauze is placed between the long ends of the sutures and tied in, forming a dressing entirely around the cut end of the prepuce. Dust

with iodoform and cover with a strip of iodoform gauze. The stitches are left undisturbed, to drop off with the dressing in six or eight days.

If a small child is to be circumcised, generally a dorsal slit, with slight trimming of the edges and no suturing, is sufficient. The part should be covered with cotton and painted with flexible collodion. No other dressing is necessary. These dressings leave the end of the penis free, that they may not become soiled by urination.

Penis—Amputation of.

Constrict the base of the penis with two or three turns of a rubber catheter and secure it with an artery forceps, to control hemorrhage. Pick the skin up, between the finger and thumb, on the dorsum of the penis. Pass a finger knife through the skin, close to the penis, and transfix a dorsal flap one and one-half inches long: *Secondly*, transfix a bottom flap, including the remainder of the skin, though somewhat shorter. Retract the flaps and cut the corpora cavernosa down to the urethra; dissect it forward half an inch and cut it off. Release the tube, and check hemorrhage by the application of cold, peroxide of hydrogen, saturated solution of antipyrine, or a four-per-cent. solution of cocaine. Saturate sterile gauze with any one of these preparations; seize the stump of the penis, and hold it tightly for

ten minutes, when hemorrhage will have ceased. Make an opening a little below the middle of the dorsal flap for the passage of the urethra; split the end of the urethra and stitch it to the skin. The flaps are united with interrupted catgut sutures, and dressed with dry gauze and bandage. If the penis is amputated at its base, an opening is made through the scrotum for the urethra to find its exit. A catheter is passed into the urethra, then drawn through the opening in the scrotum, thus enabling the surgeon to keep trace of the end of the urethra: or, a suture may be passed through the end of the severed urethra and the needle carried through the scrotal slit, drawing the urethra into its new opening. The end of the urethra is split and sutured to the skin, as in the former operation.

Urethrotomy—Internal.

This operation is demanded in cases of stricture of the urethra, which have resisted other forms of treatment. In the majority of cases of stricture the only preparatory treatment of the patient necessary is to render the urine sterile, and this is best done by the administration of the following:

R Salol, ʒj.
Oleum Gaultheria, ʒij.
M. Ft. sol.

Sig.: Gtts. xv every four hours for three days prior to operation.

At the time of operation, irrigate the bladder with a boric acid solution. Then cocaineize the urethra, and introduce a Banks' dilating filiform bougie, gradually increasing the size, until the urethra is sufficiently dilated to allow of the passage of the urethrotome, which is dilated according to the demands of the case. The roof of the urethra is incised first; then, if thought necessary, the urethrotome is turned over, and the floor is incised by withdrawing the instrument in the same manner as for above. This treatment is applicable at whatever point in the urethra a stricture is found. The urine should be kept sterile and a sound introduced every third day until the patient is well.

Urethrotomy, External--Perineal.

Sterilize the urine, irrigate the bladder with a boric acid solution, and pass a grooved sound into the bladder, having an assistant hold it well against the pubic bone in the median line. Then, with the index finger of the left hand in the rectum, cut down to the groove in the sound and carry the point of the knife back to the prostate, if necessary to cut the stricture. If a grooved sound can not be passed, then the operation must be done without a guide. The index finger of the left hand is placed on the perineum, midway between the anus and the scrotum, and firm

pressure made against the pubis, when the urethra is felt to roll under the finger. The point of the scalpel is placed directly over the urethra at this point, and, with one hard push, the point of the knife is made to enter the urethral canal.

Prostatectomy.

Make a transverse semi-circular incision with its convexity looking backward, three inches in length, just anterior to the tuber ischii. The tissues between the urethral canal and the rectum are carefully and bluntly dissected loose with the fingers, until the prostate gland is reached, when the middle lobe is dissected off. There is very little hemorrhage unless the artery of the bulb is cut. If cut, the pudic artery should be ligated, as it passes around the tuberosity of the ischium. The wound is closed, and dressed with a gauze compress and T bandage.

Cystotomy—Suprapubic.

Open the bowels on the evening previous, and give a laxative on the morning of the operation. Whenever a cystotomy is demanded, the suprapubic route is preferred by such authorities as Wyeth, Bull, Treves and McBurney. Dr. Wyeth has performed this operation more than fifty times, with the most gratifying results. The urine should be sterilized by the administration of the oil of

gaultheria and salol, as recommended in urethrotomy. At the time of the operation the bladder is irrigated with boric acid solution. The patient is placed in Trendelenberg's position. If there is no adjustable table convenient, an ordinary chair, turned down upon the operating table, answers well. The patient is placed upon it with his shoulders resting upon the table and the knees hanging over the lower rung. A soft catheter is passed, through which the bladder is filled with air, pumped in with a Davidson's syringe attached to the catheter. The catheter is withdrawn, and a curved steel sound introduced and held in such a manner that its point presses against the anterior wall of the bladder in the median line just above the pubis. Make an incision two inches in length from the pubis, up over the bladder to the mucous membrane. Pick it up with thumb forceps on both sides of the point of the sound, and with the scalpel cut down on the point of the sound; introduce the finger and enlarge the opening. Pass a retraction suture through each side of the wound, that it may be held open until the operation is completed. In performing this operation the peritoneal cavity should not be opened; neither should the space just above and behind the pubis, as it does not drain well.

When the bladder is opened, the finger is introduced and all foreign bodies removed; after which, the bladder is irrigated with boric acid solution. Check all hemorrhage, and dress the wound as follows: If the patient is a child, simply turn it upon its face for a few days, with sterile gauze over the wound to absorb the dribbling urine. With proper cleanliness the patient need not remain in bed longer than a few days.

If the patient is an adult, the treatment is quite the reverse. A Trendelenberg T tube is made of soft rubber tubing, and introduced through the wound into the bladder, and secured by passing a safety pin through its end. A soft catheter is passed through the Trendelenberg tube and the bladder irrigated with boric acid solution, morning and evening, for one week or more, until the urine becomes sweet. This operation, in the adult, is often followed by delirium, from what cause we are, as yet, unable to determine. These cases should, in the adult, be drained. This is best done by a drain perfected in the following manner: Take a fountain syringe and attach by stitches to its tube—two and one-half feet from the bag, where a hole is cut—a soft rubber tube. The joint is made secure by the application of rubber tissue dissolved in chloroform, and over this a few strips

of rubber adhesive plaster. A loose knot is tied in the long tube below the joint, forming a trap. Fill the syringe with water, suspending it near the bed, high enough for the long tube to hang straight; otherwise the apparatus will not work. Introduce the end of the short tube through the wound into the bladder. The flow of water through the long tube is regulated by a properly adjusted clamp, allowing the passage of only one or two drops of water per second, this being quite sufficient to perfectly drain the bladder.

Lithotomy, Lateral—Perineal.

In this, as in supra-pubic lithotomy or cystotomy, the urine is sterilized for three days prior to the operation by the administration of salol and oil of gaultheria, in the proportion of one to two, xx gtts. of which should be given in capsules every four hours. The evening before the operation the patient should have a laxative to move the bowels well, and an injection on the morning of the operation. The parts are well shaved, and rendered as nearly sterile as possible by the free use of green soap, hot water, scrubbing brush and bichloride solution; then washed off with ether. The urine is drawn and the bladder irrigated with boric acid solution, v. grs. : $\bar{5}$ i; then a grooved staff is passed into the bladder. Place the patient in the lithotomy

position, the hands being tied to the ankles with strips of bandage. Bring the nates down over the end of the table, and have an assistant hold the grooved staff directly in the middle line, pressing against the perineum. The surgeon is seated, facing the buttocks; passes the index finger of the left hand into the rectum, and with the scalpel he makes an incision, beginning at a point midway between the scrotum and the anus, and slightly to the left of the median line, downward and outward, to a point below the anus, near the tuberosity of the ischium. This wound is deepened until the groove can be felt in the staff, into which the point of the knife is placed, carrying it backward, dividing the compressor urethra along with the membranous portion. Now, turn the edge of the knife somewhat toward the patient's left (the longest diameter of the prostate), and push it through the prostate into the bladder. The finger is carried along the staff into the bladder, and the stone located. The staff is then withdrawn and the forceps passed along the finger into the bladder for removal of the stone; though the finger alone answers this purpose best. Dust the wound with iodoform, and place the patient in bed on a rubber bed-pan to catch the escaping urine. The urine generally passes by the urethra on the third day; as, by that time, the swelling has

subsided. If hemorrhage gives trouble at the time of operation, or several hours afterwards, tie the bleeding points, if possible; otherwise apply an umbrella tampon, through the center of which, a rubber catheter is packed to relieve the bladder of urine. The tampon may be removed in thirty-six hours with safety. If necessary irrigate the bladder with boric acid solution.

Lithotomy—Median.

The principal demands for this operation are for very small stones, foreign bodies and explorations. With the same precautions for cleanliness, as in the above operation, the patient is placed in the lithotomy position, and a grooved staff passed into the bladder. The index finger of the left hand is passed into the rectum, until the apex of the prostate is felt, while the assistant holds the staff in the median line and well up against the pubis. The operator introduces the point of the knife half an inch in front of the anus, carrying the point of the knife into the groove in the staff, nicking the apex of the prostate, and with an anterior cut, dividing the membranous portion of the urethra.

Litholapaxy.

In this operation the stone is crushed and removed at the same time. The instruments best

adapted to this work are those proposed by Bigelow, consisting of a lithotrite for crushing the stone and an evacuator for removing it after being crushed. The patient is prepared as for other operations for stone. The lithotrite is gently passed through the urethra into the bladder, which contains \mathfrak{zvi} or \mathfrak{zviiij} of boric acid solution; the male blade is slightly withdrawn to open the beak of the instrument, and in a short time closed; generally the stone falls in the grasp of the lithotrite. If it does not, rotate the instrument to right and left and repeat until the stone is grasped. All movements of the instrument in the bladder should be made with the greatest care. The stone having been grasped, the lithotrite is slightly withdrawn, the screw gradually turned, and pressure increased until the stone is completely crushed. The male blade is then screwed tightly, to crush all intervening fragments, and the seizing and crushing process continued until all the fragments are pulverized; after which, the lithotrite is firmly closed and withdrawn, and in adults, a 28 or 30 (French) evacuating tube introduced. The tube is connected with the bulb, the stopcock turned, and gentle compression of the bulb made with the right hand, while the tube is supported with the left. If the sensation of nibbling is felt at the end of the tube it indicates that the bladder requires

more fluid in it. If the blades become locked, they are made to protrude in the perineum or above the pubis, cut down upon, unlocked and withdrawn, and the remainder of the stone removed through this opening, and the case treated as a simple lithotomy. After treatment—rest in bed, warm fomentations to epigastrium, milk diet, boric acid by the mouth, with small doses of quinine. Keep the bowels relaxed.

Litholapaxy in children, of recent years, has come into use, and is preferred by many surgeons; although no less an authority than Mr. E. Hurry Fenwick, of St. Peter's, London, prefers perineal lithotomy, claiming from this operation to have invariably secured perfect results.

Castration.

Shave and sterilize the field of operation, and make an incision, two inches in length; the middle of which, corresponds to the spine of the pubis, exposing the spermatic cord. Pass the finger beneath the cord, separate it well from its bed, and ligate it tightly with catgut; that the nerve may be paralyzed, as well as the circulation controlled. Sever the cord to the distal side of the ligature, seize the distal end of the cord with dry gauze, to prevent its slipping, and draw the testicle from the scrotum. Close the wound with continuous catgut sutures, paint

the scar with iodoform collodion, and dress with dry gauze and bandage. If castration is done for tuberculous testicle; before the cord is ligated, the vas deferens is separated from the cord, and as much of it as possible drawn out. Often the entire vas comes away, measuring from ten to twelve inches. When sinuses of the testicle are present, each one should be curetted, irrigated with bichloride solution, and packed with iodoform gauze. Then a circular incision is made completely around the sinus through the skin and fascia, and the whole drawn through the wound with the testicle. The wounds are closed and dressed as above.

Varicocele—Operation for (Bennett).

The field of operation is rendered perfectly sterile by shaving and scrubbing; after which, an incision, three inches in length, is made from the spine of the pubis down over the scrotum, exposing the mass of veins. The skin is rendered tense by having an assistant draw down upon the testicle. The cord, vas deferens, and two or three veins, are separated from the varicose mass, and a large-sized catgut ligature is passed beneath the veins, high up, and tied tightly, leaving one end of the ligature long: then, with another ligature of the same material, the veins are ligated, en masse, low down, leav-

ing one end of the ligature long. Excise the intervening mass with scissors, and tie the long ends of the ligatures together, thus approximating the severed ends of the veins. Before absorption of the ligatures has taken place the stumps have become united. Close the wound with a continuous catgut suture, and paint the scar with iodoform collodion. Dress with dry sterile gauze. I have seen, at St. George's, London, the originator of this method do the operation in his own peculiar style; and he says, that, having performed the operation many hundreds of times, he finds ablation of the scrotum to be absolutely unnecessary, as it will invariably retract of its own accord.

Hydrocele—Operation for.

Shave and cleanse the parts. Seize the scrotum; render the skin tense, and plunge a small trocar and canula into the hydrocele, withdrawing the trocar and leaving the canula *in situ*, allowing the water to flow out. Through the canula is passed a long hypodermic needle, attached to a syringe, loaded with xx to xl gtts. of pure carbolic acid, and the acid injected: when the canula, along with the needle, is withdrawn, the scrotum is manipulated between the fingers to diffuse the acid over the entire sac. There will be a considerable doughy swelling for

a few days, but it rapidly subsides, leaving the patient generally cured. This technique is preferred by Wyeth and Bodine, of New York, and Fenwick, of St. Peter's, London.

Hydrocele—Open Operation for.

An incision is made over the anterior aspect of the scrotum, down to the sac, which is very dark in appearance, and is dissected out, intact, and cut off; check the hemorrhage; close the tissues over the testicle with buried catgut sutures, finally closing the skin with a continuous catgut suture, and paint the scar with flexible iodoform collodion; dress with dry sterile gauze. Fenwick—previously quoted—aspirates the sac, fills it with melted paraffine and allows it to harden; then dissects the sac out, intact.

Gonorrhea—Treatment of (Janet.)

When the patient presents himself, begin with the following:

R Salol, ʒj.
 Oleum Gaultheria, ʒij.
 M. Ft. sol.

Sig. Gtts. xx, in capsules, three times per diem until the urine is rendered sterile.

This treatment should be kept up for three weeks after all symptoms have disappeared. At the same time, irrigation of the urethra with

a solution of pot. permanganas as hot as can be borne, after cocainizing the urethra, is continued for twenty minutes. The strength of the solution is, 5j of a saturated solution of pot. permanganas to Oj of water; this equals grs. ij to 5j, or xx grs. to Oj = 1:3000; its color is that of sherry wine. A soft fenestrated catheter is attached to a fountain syringe and introduced to the cut-off muscle. Three quarts of this solution is allowed to flow through the urethra every day. A yet better device is an irrigator devised by Chetwood, of New York; by closing one side, the urethra is distended with the solution, which is then allowed to escape. In this way every sulcus is distended and irrigated. The patient must abstain from alcohol, sexual intercourse, and excessive eating, keeping the bowels open. If this course of treatment is adhered to, a cure may be expected by the end of the second week in the majority of cases.

In cases of gleet, to locate the spot of irritation, have the patient pass his urine in two glasses. If the first contains tripper faden, the inflamed area is in the anterior urethra; if in the second, the inflamed area is in the deep urethra. Again, the spot may be located by the introduction of a straight sound to the cut-off muscle; withdraw it and milk the urethra. If a drop of pus is squeezed out, the inflammation is in the an-

terior urethra. If you fail to get pus, introduce a curved sound into the bladder, withdraw it and milk as before; if you get pus then, the inflammation is within the deep urethra. Inflamed spots in the anterior urethra are easily located and treated through the endoscope. In the treatment of this disease, nothing answers so well as deep injections of argenti nitras, 1 to 4 grs. to $\bar{5}$ i of water. In the beginning, 1 gr. to $\bar{5}$ i is injected with an Ultzman's deep urethral syringe into the deep urethra. The strength of the solution is increased every week until a cure is effected. If the patient suffer from chordee, let him keep the bowels well open, sleep on a hard bed with light cover, and live upon unstimulating food. If it is necessary to resort to drugs, Dr. J. A. Bodine, of New York, says the following is the best:

R Camphor Monobromate, $\bar{5}$ j.

Ext. Lupuline (made from the pollen of the flowers), $\bar{3}$ j.

M. Ft. cap. No. xxiv.

Sig. One every hour until four are taken before retiring.

This is also good for the control of nocturnal emissions.

Gonorrhea—Treatment of (Lyon).

If the case is seen in the first forty-eight hours of its existence, irrigate the urethra with a solution of soda bicarb. $\bar{5}$ i to 0j of warm water: Second, irrigate the urethra with a four-per cent solution of cocaine, after which the cocaine is well washed out with sterile water. When the urethra is well anesthetized, it is injected with $\bar{5}$ j to $\bar{5}$ ij of a four-per-cent solution of argenti nitras, 19 grs. to $\bar{5}$ j. Do not force the injection behind the cut-off muscle. Have the patient compress the meatus between the thumb and finger, thus retaining the fluid for five minutes. After allowing the fluid to escape, the urethra is again irrigated with a bicarbonate of soda solution. On the second day the above technique is carried out in full, with the exception of the strength of the silver solution, which is three per cent, 14 grs. to $\bar{5}$ i. On the third day repeat the above, reducing the silver solution to two per cent, 9 grs. to $\bar{5}$ i. For each succeeding day's treatment the silver solution is made weaker until the case is cured. This generally requires from four to six days.

Gonorrhea—Treatment of (Neisser.)

The following course of treatment for gonorrhea is recommended by Neisser, of Breslau, as

an ideal one: The gonococcus must first be demonstrated, and it must be ascertained if the posterior urethra is also affected. Diagnosis being clearly made out, systematic injections are begun, in the following manner. The patient must begin by injecting into his urethra one-fourth or one-half-per-cent solution of protargol for a day or two, and gradually increasing it to one or two per cent. In mild cases three injections per diem are quite sufficient: the first two, remaining in, ten minutes each, the third in, thirty minutes. If the secretion is profuse, the injection should be repeated five times per day. After a few days one injection per diem will often suffice: the protargol being replaced, for the other two, by a solution of zinc sulphate. This treatment is painless, and the protargol should be continued once daily for at least one week after the gonococci have disappeared. If the affection is only located in the anterior urethra, an ordinary urethral syringe, holding three drachms, is used for injection; while, upon the other hand, if the disease has invaded the deep urethra, the injection is best made with a hand syringe, having a glass tip fitting tightly enough to close up the meatus, and the capacity of which should be about five ounces. The solution is gradually injected, to slowly find its way into the deep urethra. To

better facilitate the injection, the meatus should be held closely to the nozzle of the syringe with the thumb and finger. The injections must be kept up, in all cases, until the urine becomes perfectly clear and free from tripper faden. Professor Neisser concludes by stating that "Protargol is the best, safest, and most rapid remedy hitherto introduced in the treatment of gonorrhea." Protargol is a silver proteid, and occurs as a yellow powder, containing about eight per cent of silver.

To prepare solutions of protargol, the powder is stirred with some water into a paste, and then diluted by adding the necessary quantity of water. Solutions of one-fourth to two per cent are generally employed.

Cystitis.

Cystitis is both acute and chronic. The treatment of acute cystitis is rest in bed, carbonated drinks, keeping the bowels open, hot hip-baths, and poultices. Suppositories of hyosciamus, morphine and belladonna, may be used to good advantage. If the urine is ammoniacal, wash the bladder with boric acid solution, grs. v to $\bar{5}$ j. This failing to give relief, do an external perineal urethrotomy and drain the bladder, using frequent irrigations of boric acid until the symptoms have subsided. The wound heals of its own accord.

Chronic Cystitis — Treatment: Remove the cause, if possible, allowing the patient milk diet, with free use of non-stimulating drinks, uva ursi, copaiba, and cubebs, if the stomach can tolerate them. If the urine is alkaline, give benzoic acid, keeping the patient at rest and washing the bladder twice per diem with a boric acid solution as hot as can be borne. In severe cases the bladder must be opened and drained, either by a suprapubic or perineal cystotomy, with frequent boric acid irrigations.

Urine—Retention of.

Retention of urine, due to spasmodic contraction of the urethra, to stricture, or to enlarged prostate, may be relieved by catheterization, if a catheter can be passed. If it can not, place the patient in a hot bath and give xxx minims tr. opii, per rectum, and, if there is no spontaneous relief, pass a catheter. If this fail, anesthetize and attempt to pass a catheter, first dilating with filiform bougies. Should these means fail, do a suprapubic aspiration or a cystotomy.

Retention brought on by a debauch is generally accompanied by enlarged prostate. Relieve by the use of catheters, if possible; otherwise, do a suprapubic aspiration or puncture; draw off only a portion of the urine at a time, thus avoiding syncope. In atony and paralysis

of the bladder the urine should be regularly drawn off with a soft catheter.

Syphilis—Treatment of.

There is but one treatment for this dread disease, and with that every practitioner is quite familiar—namely, the mercurials in their varied forms and modes of application, in connection with the iodides. Fournier, of the Hospital St. Louis, Paris, who conducts a skin and venereal clinic only second in size to the great clinic of Vienna, said to me that, if this treatment was persisted in, entire relief would be the inevitable result. He further states that, under no circumstances, should a patient be put upon a specific course of treatment until sure the case is one of syphilis. It is far better to temporize with placebos until the case has developed, than to subject your patient to a course of treatment of which he has no need. Some patients bear mercury badly, when administered per orem, by inunction, or in the form of the vapor bath. In such cases the following has been employed, with some degree of success, by Keyes and Chetwood, of New York:

℞ Hydrarg. Salicylate, grs. xxiv.
 Liquid Benzoanol, ℥i.
 M.

Sig. ℥ss into the buttocks hypdermatically, once a week; or, if indicated, the dose may be increased.

Dr. J. A. Bodine, of the New York Polyclinic, states that painful syphilitic ulcers of the mouth are relieved instantly by application of the following:

R Chromic Acid, gtts. x.
 Aqua dest., ℥j.
 M.

Sig. Apply to ulcers once per diem with a camel's hair brush.

Soft venereal condylomata are best treated by the application of the following:

R Hydrarg. Chlor. Corros., grs. iv.
 Contractile Collodion, ℥i.
 M.

Sig. Paint over the warts once per diem until they have disappeared.

Which is generally from six to ten days.

Serpiginous ulcers are cured by specific treatment.

RECTUM—DISEASES OF.

The first and most important thing in the treatment of diseases of the rectum is to make a diagnosis. Place the patient on the elbows and knees with the buttocks slightly elevated, or in the Sims position; and with the index finger of the left hand, well oiled, make a thorough

examination of the rectum as high up as possible; after which, the buttocks are well retracted, having the patient to bear down as if passing a stool. If the case be one of fissure, the anus remains contracted and rigid; while, upon the other hand, internal hemorrhoids, polypi, or any tumor which may be present, will protrude. With the well-educated finger introduced into the rectum, almost any disease of that organ may be readily diagnosed. Inspection reveals to the surgeon everything that can be brought into view. If the anus is marked by several fissures, accompanied by ulceration, it is almost certainly syphilitic in origin. The speculum is rarely necessary in making rectal examinations.

Rectum—Operations upon.

It is not my purpose to enter largely into details as regards the operative technique of rectal surgery; but simply to give the steps of a few of the operations which most commonly confront the busy practitioner. I will suggest, by way of introduction, that one of the most important steps in the successful treatment of rectal diseases is the proper preparation of the patient for operation. The bowels should be thoroughly evacuated twenty-four hours before the operation, and followed by an enema the evening before and on the morning of the operation. In

addition, the patient is given a hot bath and clean linen, and placed upon the table and anesthetized. Either the dorsal or Sims position may be employed, at the discretion of the surgeon. At St. Marks, London, the Sims position is always preferred; the operator passes his thumbs into the rectum, dilating the sphincter well; after which, the protruding parts are thoroughly irrigated with bichloride solution, 1:3000. The above precautions are applicable to all rectal operations.

Hemorrhoids—Ligation of.

Place the patient in the dorsal position, with the buttocks on a Kelly pad drawn well over the end of the table, and with the legs supported by Clover's crutch, or by assistants. The surgeon seats himself between the patient's legs, facing the buttocks, and introduces his well-oiled thumbs into the patient's anus, freely dilating the sphincter. The tumor, whether internal or external, is seized with a volsella forceps, drawn down and incised around its muco-cutaneous junction. The mucous membrane above is only slightly nicked for the reception of the ligature; if cut deeply at this point, the artery supplying the tumor will be severed. While the tumor is held steady by an assistant, the surgeon places a very stout silk ligature around the tumor, and

ties very tightly, leaving the end of the ligature long, facilitating its removal. The tumor is cut off to the distal side of the ligature, with straight scissors, being very careful not to approach too closely to the ligature allowing it to slip off. Each succeeding tumor is treated in the same manner, until they are all removed. As a general thing, if there is but one pile, it is perineal; and especially in young women, in whom they bleed freely. Dressing consists of dusting with iodoform, and the application of sterile gauze, cotton and a T-bandage.

All cases operated upon in St. Mark's, London, are dressed with pledgets of cotton squeezed out of bichloride solution 1:3000, and held in place by a T-bandage. The above technique is practiced and recommended by Dr. J. M. Mathews, of this city, and is regarded by the author as the best. Mr. Goodsall, as does other London surgeons, simply makes an incision through the muco-cutaneous junction, and ties high up on the mucous membrane. After operations upon the rectum, the bowels are permitted to move every day and the parts kept clean by the employment of frequent irrigations of bichloride solution 1:3000. Perfect rest in bed should be enjoined until the patient is entirely well.

Hemorrhoids—Treatment of by the Clamp and Cautery.

For this operation the preliminaries are the same as for the employment of the ligature; The tumor is seized with a volsella forceps, drawn down, and its cutaneous base incised as in the ligature operation. The clamp is applied in the line of incision, with its point away from the rectum, when the tumor is securely clamped and a strip of moist gauze placed around and beneath the clamp, protecting the tissues from the heat of the cautery. If the tumor is a large one, a portion of it may be cut away with the scissors. The tumor is then burned off gradually, with the cautery, down to the clamp; after which, the clamp is removed. Each succeeding tumor is treated in a similar manner, until they are all removed. Dust the parts with iodoform, and apply dry gauze, cotton and bandage. The bowels should be moved every one or two days, and the parts well irrigated with bichloride solution until relieved.

Hemorrhoids—Whitehead's Operation for.

I will give here the details of this operation, as I saw it performed by Mr. Treves, of the London Hospital. He prefers this operation, and says it is the only reliable treatment. With the

patient in the dorsal position, the surgeon seats himself at the end of the table, facing the patient's buttocks, and, with the thumbs oiled, they are slipped into the rectum and the sphincter well dilated. An incision is then carried around the anus at the muco-cutaneous junction, the mucous membrane is bluntly dissected loose with the fingers and the scissors; the bleeding points are clamped as the dissection proceeds, and the entire pile-bearing area is dissected loose, allowing it to hang outside the anus. The parts dissected loose are held by the assistant, while the operator passes an anterior-posterior suture through the mucous membrane, including both the anterior and the posterior edges of the skin wound; a transverse suture is passed in a similar manner. They are then drawn upon in the caliber of the rectum and cut; a small transverse nick is made in the mucous membrane, opposite the four sutures, and each tied, anchoring the mucous membrane in its new position. That portion of the mucous membrane below the sutures is cut away, and catgut sutures applied as the cutting proceeds. If these precautions are adhered to there will be but little hemorrhage. About twenty sutures are required. If the muco-cutaneous junction does not fit nicely, a continuous catgut suture may be carried completely around the rectum. Generally

no pain follows the operation. Dressing—iodoform, dry gauze, cotton and T-bandage.

Fistula in Ano—Operation for.

This disease, generally, is due to an ischio-rectal abscess. The patient having previously been prepared, the sphincter is well dilated, and the rectum irrigated with bichloride solution. Then, with a silver probe, the fistula is traced to its termination into the bowel, which is generally between the internal and the external sphincter muscles. Mr. Goodsall, of St. Mark's, says: "If a fistulous opening is posterior to a transverse line drawn across the center of the anus, the internal opening is in the posterior part of the gut in the middle line, provided the external opening is in one-half inch of the anus. If it is one inch away, it may burrow deeply and form a horseshoe fistula." If it is a blind external fistula, it should be transformed into a complete one, by passing the point of the grooved director through the side of the bowel upon the index finger, which has been introduced into the rectum. The finger now guides the point of the director out of the anus, and with a curved-pointed bistoury, the bridge of tissue, supported by the director, is completely severed, and the edges of the wound trimmed. Under rare circumstances should the internal sphincter be

divided. This, Dr. Mathews, tells me, is seldom, if ever, necessary, and the external never more than once during the same operation. The sinus must be dissected or curetted out, otherwise, the parts are very slow to heal.

The after-treatment consists in packing the wound, well, to the bottom with iodoform gauze, and applying cotton and a T-bandage. The wound should be irrigated with bichloride solution, and repacked every one or two days; patient, in the meantime, remaining quiet in bed. The bowels should be kept loose, and moved on the second day following the operation; and every day thereafter, until recovery is complete. To illustrate the thoroughness of the above technique, I will refer to the case of Mrs. S., upon whom I have recently operated. She had been troubled with a blind external fistula, until the parts were very much indurated. This fistula was made a complete one, according to the rules above given; freely incised, edges trimmed, all of the indurated tissue curetted out with a Volkman's sharp spoon, packed with iodoform gauze, which was removed every twenty-four hours, and the wound irrigated with 1:3000 bichloride solution. The patient suffered no pain, and not a single drop of pus was present throughout the convalescence, which was rapid and complete. At St. Mark's, pledgets of cot-

ton wool, wet with bichloride solution, are packed into the wound, and removed on the morning after the operation. The parts are frequently irrigated with bichloride solution.

From time immemorial, surgeons have advised against operating on fistula in ano in patients who are the unfortunate victims of phthisis.

Dr. J. M. Mathews, of this city, who has an international reputation as a rectal surgeon, informs me “that in all cases where the fistula gives trouble there should be no hesitation in doing an operation.”

He further states; that, having done many operations of this character, he has yet to see the ill-effects, so often claimed, upon the lungs or any other organ of the body. He also says: “The wound heals kindly and without trouble.” Personally, I have never hesitated to operate, and have never had cause to regret operation.

Rectum—Excision of (Kraske).

This operation is done for the removal of malignant growths of the rectum. Place the patient in an exaggerated Sims position, with a Kelly pad beneath the hip; irrigate the rectum well with bichloride solution, 1:3000, after which, it is stuffed with cotton or gauze. Make an incision extending from the posterior margin of the anus, along the right border of the sacrum,

to a point opposite its middle and lower third, and extending across to the opposite side of the bone. Pass the index finger of the left hand between the rectum and sacrum; dissect it loose, introduce a strip of gauze, and saw or chisel through the bone in the line of incision and turn the flap, including the piece of detached bone, back over the left buttock; dissect the rectum well loose; draw it down, and, if possible, after removal of the diseased portion, stitch it to the sphincter ani. If this can not be accomplished, stitch it in the wound by the side of the sacrum, establishing an artificial anus; close the wound and dress antiseptically. Personally, I would do an inguinal colotomy, after Mr. Goodsall's technique, establishing a permanent artificial anus. If the tumor is movable in four weeks after this operation, excision of the rectum may be done, along with removal of the coccyx, the reasons for which are self-explanatory. Dressings—iodoform, cotton, and bandage.

Fissure of the Anus—Operation For.

Fissure of the anus is one of the smallest, as well as, one of the most distressing, of human ailments. Fissures are most frequently found posteriorly. The operation for the relief of a fissure is simple, easy, rapid and radical. The patient is anesthetized, the sphincter ani thor-

oughly dilated and kneaded, with the thumbs in the rectum; after which, if desired by the surgeon, the point of the scalpel may be drawn through the base of the fissure, dividing a few of the superficial fibers of the external sphincter muscle. The rest secured from a thorough dilatation is, in the majority of cases, quite sufficient to effect a complete cure. Palliative treatment for fissure of the anus should not even be considered. After treatment—have the bowels move every day, and sponge the anus after each action with hot bichloride solution.

Ulcer, Obstinate, of the Rectum.

If these ulcers are of a specific or a malignant nature, they are treated accordingly; otherwise, dilate the sphincter ani well, and paint the ulcer with a solution of methylene blue, grs. v to $\overline{3}$ j of water, and dust the parts with iodoform or acetanilid. This treatment should be repeated every two days until the ulcers have healed, in the meantime, keeping the bowels open. At St. Mark's, the external sphincter, being thoroughly dilated, is cut, allowing the parts perfect rest; after which, the ulcers are painted with a five-per-cent solution of argenti nitras every day, keeping the bowels well open. Before each action, an injection of sweet oil should be given, protecting the ulcers from the friction of the

faeces. If the ulcer is only simple, the sphincter should, under no circumstances, be incised. In many cases, the general condition of the patient must be improved by tonics and nutritious food. Deep ulcers, high up the rectum, are best treated by the application of nitrate of silver, fused on the end of a probe, by melting it in a watch glass, and rolling the end of the probe in it while cooling. Two or three applications generally suffice for a cure.

Simple ulcers of the rectum may be cured by dilating the sphincter, keeping the actions soft, and painting the ulcers every two days with a five-per-cent solution of argenti nitras, allowing the patient to use an enæma of sweet oil before each action.

Rectum, Stricture of—Treatment.

If it is a benign fibrous stricture, it may be kept patent by frequent dilatation with a Wales' bougie, beginning with the small and increasing the size as the case demands. The urgency of the symptoms serve as a guide as to the frequency of the introduction of the bougies; generally once every one or two weeks will keep the bowel open. The patency of the rectum may be maintained for years by persisting in this treatment. If the stricture becomes so close that it gives great trouble, it may be partially or

completely divided, or excision of the strictured portion of the bowel may be done. Mr. Goodsall related a case to me, upon which he had operated for closed stricture near the sigmoid flexure, four years previous; he opened the abdomen and excised the strictured portion of gut, doing an end to end anastomosis.

In close strictures, low down, an excision may be done through the incision used in doing a Kraske operation. If radical steps are not to be considered, an inguinal colotomy must be resorted to.

When the stricture is malignant and of recent development, and the trouble has not become systemic, removal of the rectum by excision should be done; otherwise, an inguinal colotomy is the last and only resort.

Rectum, Prolapse of—Treatment.

Prolapse of the rectum has been subjected to various forms of treatment; but I shall relate only the most satisfactory ones. If the prolapse is a partial one, including only the mucous membrane, the milder forms of treatment are applicable. Thoroughly evacuate the bowels, and irrigate the prolapse with 1 : 3000 bichloride solution; wipe dry with sterile gauze, and make from four to eight linear eschars, one or two inches in length, with the actual cautery;

after which, the parts are well oiled and reduced within the sphincter.

Another, and a very good operation, is the following: A longitudinal strip of mucous membrane is clamped with the pile clamps and burned away with the cautery; after which, the parts are oiled and returned inside the sphincter. This last operation is preferred by some of the leading European surgeons.

A third operation, and the one preferred by Dr. Mathews, of this city, is the following: He catches up a longitudinal section of mucous membrane with the pile clamps, and transfixes its base with a strong silk ligature, tying tightly on both sides; after which, he cuts the mucous membrane off close to the ligature. This is repeated several times, going around the circumference of the gut, if necessary. Dust the parts with iodoform, and return them inside the sphincter. Apply a gauze pad and T-bandage. Do not allow the bowels to move for three days; a laxative is then given, and an enæma of sweet oil just before the bowels move. After this, very little treatment is needed.

If the prolapse is complete, constituting an invagination, and failing to relieve the patient by the above treatment, we should resort to more radical means. In these cases, not only the mucous membrane, but the entire thickness of

the bowel wall is involved. Because of the relaxed condition of the sphincter, the gut drops through the opening, often assuming considerable size. I will give the technique of an operation of this character performed at the St. Louis Hospital, Paris, by M. Gustave Richelot:—The patient, a woman, was placed in the lithotomy position, and, with a bullet forceps, the prolapsed portion of gut drawn down—this being two inches in diameter and three inches long. After irrigating the protrusion, it was clamped on both sides with two long hysterectomy forceps, one blade passing into the caliber of the gut, and the other on the outside; with scissors the gut is cut through its entire thickness, between the two forceps on both sides, forming an anterior and a posterior lip. Care should be taken not to split the gut so high as to open the peritoneal cavity. At this point two long-billed hysterectomy forceps are made to clasp the flaps transversely, as high up as possible, which are cut off one-eighth of an inch below the clamp. The stump is sewed together with a continuous catgut suture entirely around the bowel, care being taken to close the corners of the wound in the gut. The clamps are removed, and the parts returned inside the anus. The operation is completed in the following manner:—An incision is made from the middle of the anus, on both

sides, extending at right angles to the anus for one inch. From the extreme ends of these two incisions, the scalpel is carried down to the tip of the coccyx, forming a triangular incision, and extending completely through the external sphincter muscle.

This flap is dissected loose from behind forward, including the posterior half of the sphincter. The wound is closed by the introduction of sutures of silkworm gut, in the same manner in which the wound is closed in complete laceration of the perineum. The first suture is passed through the skin, half an inch from the cut end of the sphincter in such a manner as to pass through its end, carrying the needle to the apex of the wound down through the opposite side, and through the end of the sphincter, emerging half an inch away in the skin and tied. The remainder of the sutures are introduced from above downward, and tied as introduced. The posterior portion of the rectum, cut loose from the sphincter in dissecting off the flap, is now stitched to the posterior portion of the anus, and a medium-sized rubber tube passed into the bowel for six inches, and left for the escape of gas and fæces.

I regard this as one of the most scientific operations for this trouble that I have ever seen.

Proctoscope—Use of.

The proctoscope—a very important and useful instrument to the rectal surgeon—was devised by Kelly, of Baltimore. This is an exceedingly dangerous instrument in the hands of the inexperienced, as more than one death has resulted from perforation of the bowel during its introduction. Kelly, also Tuttle, of New York, have used the proctoscope largely, and with the most gratifying results. Its most important use is in the diagnosis and treatment of ulcers, etc., high up in the bowel, and especially in the sigmoid flexure and colon. For diagnosis and treatment the proctoscope is passed as high up the bowel as necessary, with great care and gentleness, and the obturator removed; after which, the canula is withdrawn very slowly, allowing the mucous membrane of the bowel to close in behind its beak, when it is closely inspected, and any ulcer, abrasion, or other lesion located and treated.

INJURIES OF JOINTS—TREATMENT OF.

I shall not enter into details with reference to joint troubles and their treatment; but will only touch upon them in a general way.

Sprains

Are twisting or injuring of a joint, with laceration or stretching of the soft parts. The treatment consists in hot baths, lasting for thirty minutes, the application of a roller bandage, and rest and elevation of the parts. When the swelling begins to subside, passive motion is made with massage, and a close strapping of the joint with numerous strips of adhesive plaster. Redress once per week, making passive motion and massage with each dressing. In sprains of the back, as in other joints, the most perfect rest is enjoined, with local depletion, hot, moist applications and counter-irritation. Keep the bowels and kidneys freely open, and use massage. If the nature of the case demands it, a plaster dressing may be applied, securing perfect rest.

Joints—Wounds of.

Wounded joints must be treated with the most perfect asepsis and rest. If the joint has been penetrated, the wound is rendered aseptic by irrigating with bichloride solution 1 : 3000, and closed as an ordinary wound, dressing the parts in a manner that will give the most perfect rest. If the joint is much lacerated, as in a case observed by the author at the German Hospital,

New York, treated by Dr. Willy Meyer, thoroughly disinfect the area of the wound, and wash out the sinovial cavity with a 1 : 3000 bichloride solution. The wound was trimmed up, and a counter opening made through the popliteal space, through which a rubber drainage tube was passed and left for drainage. The wound was then closed, dressed with dry sterile gauze and bandage. This being the knee-joint, the leg was placed on a splint, padded with cotton, and rendered immobile. This case healed without suppuration or loss of function of the joint. If the joint suppurates, it is treated with the greatest antiseptic precautions, consisting of irrigation, drainage and sterile dressing, with perfect rest.

Synovitis—Treatment of.

Synovitis—an inflammation of the synovial membrane of a joint—is both acute and chronic. In the acute form, antiphlogistic treatment is used, with perfect rest. If the joint becomes distended with fluid, aspirate it, give light, unstimulating diet, and keep the bowels and kidneys active. The chronic form is best treated by counter-irritation, fly blisters, tincture of iodine, or slight scarifications with the actual cautery, hot applications, etc., followed by elastic bandaging. In severe cases, it may become necessary to inject the joint with equal parts of tincture of

iodine and distilled water, and immobilize in a plaster dressing. If the trouble is due to a specific diathesis, it should be treated accordingly.

Arthritis.

Arthritis is an inflammation of the articular cartilages of joints, all the structures of the joint being generally involved. This trouble is both acute and chronic, and may assume serious proportions. The treatment of the acute form is absolute rest and position, with either cold or heat. If suppuration ensues, open the joint, drain, and treat antiseptically. Should this treatment fail to give relief, the limb may have to be amputated. The general standard of the patient's health should be kept at par by the liberal use of food, tonics and stimulants. The chronic form is treated by absolute rest, good food, and reconstructive tonics, stimulants and fresh air. The treatment may extend over months.

Coxalgia—Hip-Joint Disease.

This is an arthritis of the hip-joint, generally of tuberculous origin, and is mostly confined to children under the age of puberty. In mild cases a fixation splint—Sayers, Thomas or Phelps—or a plaster dressing, and a high shoe raised three inches on the sound side, and the

patient allowed to walk with crutches. In more severe cases, complete rest in bed, with Buck's extension; paint the diseased joint with tincture of iodine. As soon as the acute symptoms have disappeared, the patient is allowed to be up, with a fixation splint, high shoe and crutches. This is to be persisted in for one year or longer. The patient is allowed, throughout the treatment, plenty of rich, nutritious food, tonics and fresh air. If at any time an abscess occurs, aspirate under aseptic precautions; and if this, after repeated efforts, fails, then an excision of the hip-joint may be necessary, with frequent irrigations and drainage.

Joints—Foreign Bodies in.

The knee-joint is most frequently the seat of foreign bodies, and the offending substance is generally a loose fragment of cartilage. In such cases the foreign body should be removed by incision into the joint, checking all hemorrhage before the joint is opened into. The foreign substance is transfixed with a needle, anchored, cut down upon and removed. If it has a pedicle it should be ligated. Cleanse the wound, dress with sterile gauze and plaster dressing. I shall only give the technique of the removal of foreign bodies from the knee-joint, as I have so often seen it done, by Mr. Treves,

of the London Hospital. After rendering the field of operation aseptic, and the application of an Esmarch bandage, an incision two inches in length is made along the inner border of the patella, the foreign body removed, and the wound closed with buried catgut and superficial sutures. Dress as above.

Joints—Ankylosis of.

This disease consists of fibrous and bony union, the first of which may be relieved by passive motion. Often, at the beginning of the treatment, under anesthesia, the joint should be flexed and distended regularly. In case of bony ankylosis, if the position is good, let it alone; otherwise, do an osteotomy or a resection, as in the case of an elbow-joint.

BONES—DISEASES OF.

Periostitis.

Periostitis is an inflammation of the covering of the bones. The best treatment is free incision, with complete drainage and irrigation. Patients frequently require nourishing diet, stimulants and tonics.

Ostitis

Is inflammation of the bone substance, and is best treated in the same way as is periostitis. Occasionally, the Haversian canals may have to be drilled into, that the pus may be allowed free exit. Also, treat any diathesis which may be present.

Osteomyelitis

Is an inflammation of the marrow of the bone, and is treated by drilling through the outer shell of the bone into the medullary canal, establishing drainage. Treat antiseptically. Some cases will require amputation, especially if showing a tendency to gangrene.

Bone—Caries of.

Caries is the molecular death of bone substance, accompanied by a discharge of pus. The soft tissues should be freely incised, exposing the diseased area of bone, which should be removed with the gouge and Volkman's sharp spoon or curette. Excision or amputation is rarely necessary.

Bone—Necrosis of.

This is death of a bone in mass. The treatment consists in the removal of all dead bone, followed by aseptic dressings, nutritious

food, tonics, stimulants and fresh air. The dead bone is removed in the following manner: Make a clean, free incision, retract the flaps, and, with the mallet and chisel, cut away every particle of dead bone, leaving, if possible, the periosteum. In minor cases, the dead bone may be removed with a Volkman sharp spoon. After treatment—pack the wound with iodoform gauze, allowing it to heal from the bottom; often irrigate with peroxide of hydrogen (with a pinch of soda bicarbonate added, relieving its acidity) and bichloride solution. The iodide of iron and cod-liver oil are often of service in suppurative bone cases, the majority of which, are of tuberculous origin.

Osteomalacia and Fragilitas Ossium.

Molites ossium is a softening of the bones, occurring most frequently in women after adult life. Fragilitas ossium is a brittleness of the bones, rendering them very liable to fracture. These troubles are best treated with nutritious food, and great care upon the part of the patient.

Potts' Disease—Treatment of.

Potts' Disease is a diseased condition of the vertebræ or their cartilages, causing an angular curvature of the spine, generally due to tubercle. The best treatment consists of perfect rest in

bed, with entire immobility of the spine by the use of the plaster jacket. If abscess occurs, open and drain at once. The patient must have the best of food and tonics. If the surgeon thinks he can successfully remove the dead bone keeping up the discharge, he should operate.

Rickets.

Rickets, *per se*, is a disease of childhood, marked by lesions of the bony system and an amyloid degeneration of the viscera. The treatment consists in the best of nutritious food, tonics, cod-liver oil and fresh air.

Spine—Curvature of.

So far, aside from braces of various kinds and the plaster jacket, there has been very little accomplished in the treatment of anterior and lateral curvature of the spine. Bilhaut, of Paris, has done some very commendable work in the treatment of backward curvature (kyphosis). While in Paris I had the pleasure of his acquaintance; and was a frequent visitor to the International Hospital, where he held his clinics. I have seen him operate upon many cases, with most excellent results. The patient is anesthetized, and placed prone upon the table; considerable pressure is made upon the most prominent portion of the curvature with the

hands; after which, the field of operation is sterilized, and an incision eight inches long is made down on the tips of the spinous processes of the vertebrae; the tissues are well retracted, and, with a sharp pair of shears, the spinous processes of the several vertebrae are trimmed off. The hemorrhage is checked, the wound closed, and the patient suspended by the feet from a pulley, an assistant making extension on the chin and head, straightening, as well as possible, the curve in the spine. While in this position, a close-fitting plaster dressing is applied, extending from the hips, including the neck and head. The patient is allowed to wear this dressing for three weeks, when it is removed, and another one applied. After having persisted in this treatment for several months, the patients are very much straighter, and in every way in a much better condition. Dr. Bilhaut informed me that he had relieved a great many cases of this hitherto incurable disease.

Knock-Knee (Genu Valgum).

This trouble becomes manifest about the time the child begins to walk. Having failed to relieve the patient with an apparatus for knock-knee, an operation should be resorted to (Treves). While in Macewen's clinic, Glasgow, I had the pleasure of seeing the great Scotch-

man perform this operation many times. He does the supracondyloid operation. A line drawn across the front of the thigh, on a line with the superior edge of the outer condyle of the femur, to the inner side of the limb, is just half an inch above the condyles; through this line, at the anterior-lateral aspect of the thigh, the chisel is introduced into a cut in the skin, and pushed into and crosswise the bone. The bone is now chiseled through two-thirds of its thickness, the chisel removed, and the wound covered with sterile gauze. The bone is then broken over a sandbag, the leg placed upon a long splint, with a foot rest, extending from the axilla to the sole of the foot. There is also a posterior splint, well padded, extending from the foot to the buttocks. The thigh is well padded and bound firmly to the splints. The foot and leg should be lightly dressed. A better dressing is made of plaster of Paris, extending from the true ribs to the toes. The limb is slightly over-corrected, and the dressing strengthened by the employment of steel strips worked into the dressing, as it is applied.

Bow Legs (Genu Varum).

This deformity is exactly the reverse of knock-knee, and should be treated by the use of braces at first; but upon their failure to relieve the

patient, an osteotomy must be done, supra-condyloid, as in genu valgum. The after treatment is the same. In mild cases no treatment is required. If the curvature involves the entire limb, it may be necessary to cut the bone at three or four different points, that the limb may be straightened.

CLUB FOOT.

This is a trouble which has received very little attention from the general practitioner. By a little skill and perseverance upon his part, many cases might be relieved, which are otherwise permitted to go without treatment, leaving the patient a cripple perhaps for life. It shall not be my purpose to enter into details as regards the treatment of club foot, but simply to refer to a few of the prevailing varieties.

Talipes Varus.

In this deformity, the inner side of the foot is drawn upward by the contraction of the tibialis anticus and posterior muscles of the calf of the leg and plantar fascia, causing the sole of the foot to look inward. Treatment—subcutaneous division of the resisting muscles, over correction, and the application of a plaster dressing.

Talipes Equinus.

This deformity consists in contraction of the tendo Achillis, or gastrocnemius and soleus muscles; raising the heel, compelling the patient to rest the foot upon the ball of the toes. Treatment—subcutaneous division of the tendo Achillis, over-correction and plaster dressing.

Talipes Valgus.

In talipes valgus the foot is everted, sole looking outwardly, due to contraction of the peroneus muscles. Treatment—massage, over-distension and plaster dressing. In some cases division, subcutaneously, of the tendons of the peroneous muscles, over-distention and plaster dressing.

Talipes Calcaneus.

In this deformity the toes are raised by contraction of the tibialis anticus, extensor longus pollicis, extensor longus digitorum and the peroneus tertius muscles. Treatment consists in the subcutaneous division of the tendons of these muscles, slight over-distention, and the application of a plaster dressing. In the treatment of club-foot the dressings should be changed every two weeks, and the foot bathed in hot water for half an hour; after which, the parts are well massaged, and the dressing reapplied.

After the dressings are discarded, shoes adapted to the restoration of a normal foot should be worn.

Flail Foot—Operation upon.

I will give the technique of this operation as performed by Dr. V. P. Gibney, of the Ruptured and Crippled Hospital, New York. An incision four inches long is made over the anterior surface of the ankle-joint to the bone. The tendons are well retracted, exposing the joint, and, with a sharp scalpel, the cartilage is trimmed off the top surface of the astragalus, leaving it convex; the end of the tibia is then chiseled off in a concave form, and the two bones brought together; all hemorrhage is checked, and the wound closed. After treatment—dry sterile dressing, with plaster dressing over it, holding the two bones in apposition until union takes place, forming a solid ankylosis.

MISCELLANEOUS OPERATIONS.

Hare Lip and Cleft Palate—Operation for.

This trouble is so apparent that it appears useless to more than give the technique of its repair. It is of the greatest importance that

the scar, remaining after this operation, shall appear insignificant as possible, especially in girls. These patients should be operated upon while young; and, particularly so, if cleft palate accompanies the hare lip; as, in early life, the superior maxilla is soft and yielding, while in later years it becomes hard and stiff. If the case is complicated with cleft palate, a hole is drilled through the bone, one-third of an inch from its edge on each side, and a stout silver wire passed through the openings; leaving both ends long. The edges of the cleft are well denuded with a sharp knife; and, with the bone forceps, the alveolar process of the superior maxillary is cut through, half to one inch back from the cleft; thus allowing the bone to be brought forward to the median line by twisting the silver suture already in place. This is left to heal; and when union is complete, the suture is removed and the plastic operation done in the following manner: The margins of the lip are trimmed with straight scissors, that, when tightly brought together, a diamond-shaped denudation presents. Secondly, the lip on both sides is freely dissected loose from the maxilla, allowing it to be brought forward and united without tension. The lip is closed with interrupted sutures of silkworm gut. The object in making the diamond-shaped denudation is, in-

stead of a gap in the margin of the lip, it presents a little projection which, in time, becomes smooth. The scar is painted with flexible iodoform collodion, over which, is placed a strip of sterile gauze, held in place by a strip of rubber adhesive plaster, extending well out on each cheek. Feed the patient upon liquid diet, and, if very young, from a spoon.

Abscess—Opening of (Hilton's Method).

An incision is made with the scalpel through the skin and cellular tissue over the most dependent part of the abscess; through which, a grooved director is passed into the pus cavity. Along this an artery forceps is carried, and when it enters the abscess the director is withdrawn and the jaws of the forceps distended, thus allowing free exit to the pus, with no danger to the parts operated upon. If necessary the forceps may be withdrawn and the finger introduced and everything cleaned out. Irrigate with peroxide of hydrogen or bichloride, and pack with iodoform gauze. This method is to be recommended in abscess of the palm or the sole, where there is danger of wounding the deep vessels.

Veins, Varicose—Radical Cure of.

The internal saphenous veins are those most frequently found in a varicose condition. The most radical treatment is to make an incision down to, and ligate, the vein every four inches along its course. All varicose veins may be cured by ligation, or the entire vein may be dissected out. These ligations must be done under the strictest aseptic precautions. Dressing—the same as for other incised wounds.

Sciatic Nerve—Wet Stretching of.

This operation is demanded in painful conditions of the sciatic nerve, when medicinal means have failed to give relief. An incision, four inches in length, is made from the natal fold down the outer edge of the biceps muscle, midway between the greater trochanter and the tuberosity of the ischium. Cut only to the muscle, then bluntly dissect between the gluteus maximus and biceps muscles to the nerve, which is imbedded in a mass of fat and areolar tissue. Pass the index finger beneath the nerve, from the outside, and raise it from its bed, pulling upon it just hard enough to raise the patient's buttocks from the bed. McBurney says, "Pull forty pounds; no more, no less." This can be regulated by the employment of a pair of draw-scales.

Ulcer, Chronic—Treatment of.

As chronic ulcers are more frequently encountered upon the legs than elsewhere, I shall simply give the treatment of these, although ulcers in other parts of the body may be treated in a similar manner. The ulcer is rendered as nearly aseptic, by the use of bichloride, as possible, and all decomposed tissue curetted away; after which, the ulcer is tightly strapped with strips of rubber plaster, and over this a snugly-fitting roller bandage is applied to protect the parts from irritation. If this treatment should fail to relieve the patient, excise the ulcer and curette to the bone, if necessary, to remove all diseased tissue. If the ulcer is due to a varicose condition of the veins, first do a radical operation for the cure of the veins; then proceed with the treatment of the ulcer, if relieving the veins does not effect a cure, as it often does.

Skin Grafting.

Skin grafting is very necessary—in large superficial wounds showing little tendency to heal—to prevent contraction and aid healing. Thiersch's technique is preferred by the majority of surgeons. The skin is thoroughly sterilized, from which the graft is to be taken; and this is best attained by shaving the parts and applying

a wet bichloride dressing for twenty-four hours prior to operation. The surface of the ulcer is shaved off and all oozing checked with hot applications; then, with the razor, as large a piece of cuticle as possible is removed from the previously sterilized skin, bathed in normal warm salt solution and smoothly applied to the ulcer. Dressing consists of a piece of rubber tissue, cut full of small holes, applied over the graft, and over this sterile gauze, wet with normal salt solution; then, a second piece of rubber tissue, cotton, and bandage. At the end of a week remove the dressings; if the parts are in a healthy condition, they have a grayish appearance. Apply a thin coating of pure white vaseline and keep moist sterile dressings applied.

Wolf dissects up a strip of skin, cuts it loose at one end, twists it upon its pedicle, and applies it to the ulcer; and, when union has taken place, cuts the pedicle loose. Lusk's method is to raise the cuticle with a fly blister, which he sterilizes and applies smoothly to the ulcer; and over which, he applies a moist sterile dressing. Reverdin's technique consists of applying small bits of skin clipped from a young, healthy subject. Dressing—same as above.

Ascites—Tapping in.

Empty the bladder, have patient sit on the side of the bed, and pass a binder around the abdomen, with which to make pressure. Make a skin incision in the linea alba, midway between the umbilicus and pubis, and thrust a trocar and canula through it and withdraw the trocar. To avoid syncope, draw off the fluid slowly, gradually tightening the binder as the liquid flows, allowing the patient to lie down.

Burns—Treatment of.

All burns should be washed and dressed under the strictest antiseptic precautions. Burns of the first and second degree are thoroughly cleaned with a bichloride solution, 1:3000; removing all loosened cuticle, cover with gauze moistened with 1:5000 bichloride, and sprinkle with iodoform; over this, a thick layer of sterile gauze, cotton, and bandage. Patients are generally relieved in ten days. Burns of the third and fourth degrees, of limited extent, are treated as those of the first and second degrees, although the dressings must be changed as often as they become soiled.

When the burn is extensive, cleanse and remove the loose cuticle, and sprinkle each denuded surface with bismuth subnitrate, cover

with cotton, held in place by a tight bandage. Frequent dressings are necessary. In deep, extensive burns, warm applications may be necessary until the slough is removed. A most excellent treatment for burns is an abundant supply of carbolyzed vaseline spread on gauze or cotton and applied to the burnt surface. It is changed as infrequently as possible; this protects the wound from the air and saves the patient much pain. When the dressings are changed the wounds should be irrigated with a bichloride solution, 1: 5000. Opium is required in most cases of burns for the relief of pain. In extensive burns, skin grafting may have to be resorted to before healing is accomplished.

Another treatment, recommended very highly by Professor Vanarsdale, of New York City, is the application of the balsam of Peru and oleum ricini on gauze:

℞ Balsam Peru, ℥v.
 Oleum Ricini, ℥xvj.
 M.

Apply on gauze or cotton; cover this thickly with cotton and bandage.

If ulceration of the ilium occurs, which it often does in severe burns about the tenth day, and there is a sudden, sharp, lancinating pain in the belly, indicating perforation of the bowel,

a laparotomy must be resorted to at once; the hemorrhage, if any, must be checked, the peritoneal cavity cleansed, and the perforation closed with Lembert sutures of fine silk. The abdominal wound is closed or left open, with drainage, at the discretion of the surgeon.

Angioma.

Angioma, or cirroid aneurism of any variety, if rapidly spreading, should be excised wide of the disease, tying the arteries as they are cut; or ligation of the main artery to the part may be done. Large superficial nævi, and those which are not increasing in size, should not be treated. Small capillary nævi may be removed by excision, cauterization, or escharotics. Venous nævi are cured by incision or ligation, the ligature being placed subcutaneously.

Aneurism.

Having failed to cure an aneurismal tumor by the repeated use of the different modes of compression recommended by the text-books on surgery, we should attempt to relieve them by operation. Hunter's proximal ligation is the operation to be preferred. The artery is tied at some distance to the proximal side of the aneurism, in a healthy portion of the artery. This can generally be done under cocaine anesthesia;

and, in large vessels, the Balance and Edmunds double ligature of floss silk should be used. If it is a traumatic aneurism, ligate above and below the tumor and turn out the clot.

Bowel Feeding.

In cases where it is not advisable to administer food per orem we must resort to skin and bowel feeding. I shall first give the technique of bowel feeding. Rectal feeding is a misnomer; therefore, instead of injecting food into the rectum, we inject it into the colon, where it can be taken up and supplied to the system.

The best food for colon feeding is peptonized milk. It is prepared by the addition of Fairchild's liquid pepsin to cow's fresh milk until it becomes intensely bitter. Oiss. should be given in twenty-four hours. Beef juice is a good bowel food. It is unnecessary to wash the bowel at each feeding, once per diem being quite sufficient. In order to give the colon injection it is necessary to elevate patient's buttocks, and introduce a soft rectal tube into the colon, attach a Davidson's syringe and inject the food. A few drops of deodorized tincture opium is added to the food to prevent its expulsion. This manner of nourishment can be resorted to in all cases, with great success, where the stomach digestion is poor.

Skin Feeding.

This I regard as an ideal mode of resuscitating debilitated patients, and especially children, who have fallen into collapse, following cholera infantum, or any other cause from which the system has sustained loss of vitality. Numerous hypodermic injections of normal salt solution, in connection with normal salt solution injected into the colon, will often revive a patient suffering with discharge from the bowels. The hypodermic injections must be repeated every three hours, until the skin becomes moist and the eyes regain their luster. In connection with the above treatment, \mathfrak{z} ij. of goose oil should be well rubbed into the patient's skin, which has been washed, permitting absorption of the oil. This should be repeated every three hours. Turkey oil or fresh butter may be used to advantage.

Surgical Necessities.

Below will be found a number of preparations which should be kept in the office, as emergencies may, at any time, require their use. They should be kept in gallon bottles. To each bottle a syphon tube should be attached, connected with a rubber tube, through which the solution can be drawn for use.

Bodine's antiseptic soap, which is made as follows:

R. White Castile or Ivory Soap (shaved), $\bar{\text{℥}}\text{xvi}$.
Aqua, Oviiij .
M.

Boil until the soap is dissolved. Dissolve in it one bichloride tablet and add $\bar{\text{℥}}\text{iv}$. of ether.

This soap may be used in preparing any case for operation.

TR. GREEN SOAP.

R. Alcohol, Oj .
Glycerine, Oj .
Green soap, Oij .
M.

Dissolve $\bar{\text{℥}}\text{i}$. of oil of gaultheria in the alcohol and add the other ingredients. The oil is only used to flavor the soap.

A saturated solution of boric acid is prepared in the following manner: Drop half pound of Wyeth's impalpable boric acid into a gallon bottle, and fill it with sterile water. This should be agitated frequently for a period of three days, when it is allowed to settle and the clear liquid poured off. Keep well corked.

All alkaloids for hypodermic use should be dissolved in saturated boric acid solution. This prevents decomposition, and they will maintain their purity indefinitely.

Saturated solution of boric acid.

1 : 3000 bichloride solution.

Two-per-cent lysol solution.

Saturated solution of potassium permanganas.

Thiersch's solution.

Acid carbolie solution, five per cent.

Saturated solution oxalic acid.

Sterilized water.

Plaster bandages.

Bandages ordinary cheese cloth, also flannel rollers

Safety pins.

Felt splints, etc.

GYNECOLOGY, OPERATIVE.

It is very important that the surgeon retain, for future reference, the details of the clinical history of each case: Age, married or single; occupation; has the patient children, if so, how many, and are they living; how many miscarriages, if any; amount and duration of menstruation, and whether it is regular; character of the discharged blood; is menstruation painful, and at what age did it begin; date of cessation of last menstruation; pains, their kind, site, and association during defecation, urination, coition, or menstruation; appetite, sleep, and disorders of the nervous system; respiration and circulation; any and what previous treatment. (Gusse-

row.) Below will be found a convenient form for keeping the history of abdominal cases. This form was presented to me by Mr. Doran, of the Good Samaritan Hospital, London, to be used in my book.

No. Date of first visit

Name

Age and condition of patient

Occupation

Place of birth

Present residence

No. of children

Age of the youngest

Abortion, if any

Mammary areola, condition of

General appearance of

Medical attendant

GENERAL EXAMINATION OF THE ABDOMEN, INSPEC- TION, PALPATION, PERCUSSION, AND AUSCULTATION.

1. Girth at umbilicus, in inches

2. Distance from ensiform cartilage to umbilicus, in
inches

3. Distance from umbilicus to symphysis pubis, in inches -----
4. Distance from right anterior-superior spine of ilium to umbilicus, in inches -----
5. Distance from left anterior-superior spine of ilium to umbilicus, in inches -----

PELVIC EXAMINATION.

Generative system, condition of -----

Urinary system, condition of -----

Digestive system, condition of -----

Respiratory system, condition of -----

Circulatory system, condition of -----

History before appearance of the tumor -----

History of patient and disease -----

Tapping or exploratory puncture -----

Diagnosis -----

Operation, date of -----

Place of operation -----

Nurse's name -----

Assistant's name -----

Visitors' names -----

Anesthetist and anesthetic used -----

Details of operation -----

Description of tumor -----

Gynecological Examination.

The method of examining the pelvic organs are instrumental and non-instrumental, vaginal and bimanual, with their modifications. Place the patient in the lithotomy position, with the head slightly raised and the feet resting in the foot-rests attached to end of the operating table; the buttocks are drawn over the end of the table and placed on a Kelly pad, especially if a douche is to be used; a pail is placed beneath the table to receive the fluid as it escapes. A vaginal examination should not be made during menstruation, unless the hemorrhage is abnormal, when it becomes imperative. The bladder should be emptied when there are abdominal tumors, unless there is disease of this organ or the urethra. If the belly is very large, palpation with both hands is done at once. In other cases, after cleansing the hands, inspect the external genitals, and note if the vulva is the seat of venereal sores, warts, pediculi, or abscesses. Separate the labiae and note the condition of the hymen, urethra, and the perineum. Have the patient to strain, observing if the anterior and posterior vaginal walls bulge, producing cystocele or rectocele. We now proceed to make a vaginal examination; and, let me suggest that a gynecologist's success largely de-

pend upon his ability to make a vaginal examination without giving the patient pain. This may be accomplished in the following manner: Separate the labiae, lubricate and introduce two fingers, with a crawling motion, over the perineum to their middle; then turn them upon their sides and pass them full length. The left side is examined with the left hand, and *vice versa*. This brings the palmar aspect of the fingers in contact with the parts to be examined. A vaginal examination should not be made in an unmarried girl unless there are reasons to suspect trouble with the pelvic organs, and then in the presence of a third party. Neither should a vaginal examination be made under anesthesia unless a third party be present. As the finger passes through the vagina, we estimate the dilatability or the bulging of its walls—that of the posterior wall due to an overloaded rectum, and that of the vaginal vault due to tumors or exudations. As the finger passes along the anterior vaginal wall, if the uterus is in its normal position, the finger comes in contact with the cervix at right angles to its axis, and, by passing the finger up to the vault of the vagina, a small hard tumor is felt in the anterior fornix, which is the body of the uterus. When the uterus is retroverted the finger comes directly in contact with the external os. The vag-

inal examination without the aid of the bimanual is of minor importance; consequently, the hand is spread flat upon the patient's abdomen, and inward and downward pressure made, while the finger of the other hand in the vagina raises the cervix upward and forward, bringing the fundus against the belly wall; with the fingers of the external hand pressed deeply behind the fundus of the uterus, and the fingers of the other hand in the vagina, carried freely up into the anterior fornix, the body of the uterus is held between the two hands. In this way its size, shape, mobility, consistency, and adhesions, if any, are determined. With the well-educated finger, the size, length, shape, and condition of the cervix are noted, as are cancer, laceration, erosions, and follicular hypertrophy.

With the aid of bimanual examination we are enabled to determine the existing condition of the pelvic organs. The ovaries and tubes are felt in the lateral fornices, by pressing the pelvic organs down with the external hand to meet the fingers in the vagina. The ovaries will be felt to roll from under the finger, and, when pressed upon, will cause the patient to feel faint. Tumors of different varieties and pus tubes are determined in this way. A pus tube feels like a hard, adherent ridge, extending from the side of the uterus to the lateral wall of the pelvis.

Rectal examination may be resorted to in young girls or unmarried women, when the hymen is intact. This is often of service, used in connection with the bimanual examination. Simons' method of passing the entire hand into the rectum is dangerous, and should seldom be employed, and then only as a last resort. Rectal examinations must be made under all circumstances when swellings of any variety are felt in the pouch of Douglas. Before introducing the finger into the rectum, the part under the free edge of the nail, as well as the groove at its base, are filled with soap, and the whole finger anointed with oil or vaseline.

Instrumental Examination.—With the aid of the speculum the operator is enabled to inspect the vagina and cervix; also the quantity and quality of the discharge, if any; the situation and size of any existing sore, fistula or new growth, as well as the shape, size, condition and color of the cervix (port-wine color in pregnancy). For general purposes, I know no better speculum than Brewer's bivalve or Nott's trivalve, extensively used by the Germans. These instruments are introduced as follows, and are self-retaining: With the patient in the dorsal position, pass two fingers of the left hand into the vagina, pressing the perineum well down; the speculum is passed into its shoulder with the blades lateral, and then rotated until

they are anterior-posterior, the blades are then gradually opened and held by the thumbscrew. Upon withdrawal of the speculum the vaginal walls are examined as they close behind the beak of the instrument. Where an operation is to be done the Sims speculum is preferred.

The uterine sound should never be used if avoidable; but, when rendered necessary, should be employed under the most perfect aseptic precautions, with the patient in the dorsal position. It should not be introduced into the uterus if the patient has missed a menstrual period, or during menstruation, acute inflammation of the pelvic organs, or in malignant disease of the uterus. When the sound is introduced it meets with resistance at the internal os. It should be held in the pen position, and under no circumstances should force be employed in its introduction. Introduce the index finger of the left hand to the anterior lip of the cervix and carry the sound along its sides into the cervical canal. The sound should never be turned upon its long axis after its introduction. If the fundus lies forward, turn the sound by making the handle sweep a semicircle from behind to the left and forward, leaving the point of the sound stationary. Depress the handle toward the perineum, and it passes without trouble. If the fundus lies posteriorly, introduce the sound, with its

concavity looking backward as before, and continue the introduction without changing its position. Under all circumstances, the sound should be curved to suit the uterine canal. The sound may be used to determine the permeability of the uterine canal, the condition of the endometrium and the direction and length of the canal. The depth of the uterus is ascertained by placing the finger upon the sound, in front of the external os, and withdrawing it; all that portion of the sound beyond the finger marks the length of the uterine canal.

Uterus, Normal Position of.

When a woman is standing, the fundus of the uterus points forward and slightly upward, toward the upper border of the symphysis pubis ("anteversion"). The broad ligaments form shelves upon which the ovaries lie. The utero-sacral ligaments are attached to the last sacral vertebra and to the junction of the cervix and fundus uteri, maintaining the uterus in its normal position. When they become lax the cervix drops down and the fundus falls backward, constituting a retroversion. It is only when the ovaries and tubes are prolapsed that they can be palpated, and then external to the utero-sacral ligaments.

Pessaries and Their Use.

In all cases of retroposed uterus, local treatment must be employed to reduce the size of the uterus as much as possible. The best treatment consists of boro-glyceride, or ichthyol and glycerine tampons, combined with frequent and copious hot douching; swab the uterus with creosote and water, 1 : 3. Before attempting to use a pessary, make all necessary repairs about the perineum, vagina or cervix. The bowels must be kept open, and the general health kept up. When the uterus is restored to a normal state, pessaries may be employed; but in the majority of cases they are not required, the properly adjusted tampon being so much better. Many cases of retroversion, in unmarried women, where there is no enlargement, are not relieved by the tampons or pessary; therefore, resort must be had to hysterorrhaphy. When a pessary has been introduced, the patient should be requested to walk around the room, and when sitting to cross her legs. Observe that the pessary is not uncomfortable; pass the finger all around outside the pessary, noting that it does not impinge upon the soft parts. The soft rubber ring, or the Smith-Hodge pessary of hard rubber, seems to be preferable; although the hard rubber ring, with a stem attachment, devised by Martin,

is preferred by Olshausen, of Berlin. By immersing in hot water, they may be molded into any desired shape. If a pessary gives pain, it should be removed by the patient at once. With the patient in the dorsal position, the uterus in place, and the bowels and bladder empty, the labiæ are separated with the finger and thumb of the left hand. Taking the pessary by the small end with the right hand, the large end of the pessary is introduced in the line of the vagina, the perineum being depressed as the pessary passes over it, when it is rotated and the large end carried by the right index finger up along the posterior vaginal wall behind the cervix. The pessary in place has its broad end behind the cervix, pointing upward and backward, while the narrow end is in front resting against the pubis, pointing downward and forward.

The patient should be examined in a few days after the introduction of a pessary. If it fits, the uterus is supported; otherwise, it must be removed and another substituted. The patient must use a vaginal douche three times per week, and the pessary must be removed and cleansed once every four weeks. Pessaries should not be worn unless under the supervision of the physician.

Plastic Operation upon the Female Genitals.

The success of all plastic operations largely depends upon the preparation of the patient prior to the operation. The bowels should be thoroughly evacuated two days before operating, and on the morning of the operation they should move, followed by an enema.

After the patient is anesthetized, she is placed in the dorsal position on the operating table, with the hips resting on a Kelly pad, and drawn well over the end of the table. The legs are strapped to the supports attached to the end of the table, or held up with Clover's crutch. The parts are thoroughly scrubbed with soap and water, shaved and irrigated with bichloride solution. To render the vagina sterile, it should be thoroughly scrubbed with soap, water and a brush; then irrigated with bichloride 1 : 3000. Cover the parts all around the field of operation with bichloride towels, and proceed with the operation. This preparation suffices for all operations on the female genitals.

Perineum, Laceration of—Operation.

Lacerations of the perineum are divided into complete and incomplete. In all cases, the laceration should be repaired as soon after the injury as practicable, and under the strictest

asepsis. If the wound has not healed by the eighth day, secondary suturing may be resorted to. Even suppurating wounds, accurately approximated, often heal (Gusserow). The best sutures for the primary are of silkworm gut or silk; and, in all cases, should be interrupted from side to side with a curved needle, allowing it to dip deeply into the tissues as it passes through. If the rent extends up the sides of the vagina into the sulci they should be closed; after which, the sutures below should be introduced, completing the closure of the laceration. Chronic laceration of the perineum is treated by two methods—by vivification and suture and by flap-splitting and suturing.

Colpoperineorrhaphy (Hegar).

Any operation upon the vagina for the purpose of diminishing its caliber is a colporrhaphy; and, for this purpose, Hegar's operation is more frequently resorted to than is any other plastic operation done upon the genitals. Anesthetize the patient, and place her in the dorsal position, with the knees supported by Clover's crutch, and a Kelly pad beneath the hips, which are drawn over the end of the table. The pad is arranged in a manner allowing it to drain in a bucket beneath the table. The vagina is thoroughly scrubbed, shaved and irrigated with bi-

chloride solution. The labiae are retracted, allowing the posterior vaginal wall to bulge forward, forming a rectocele. With a tenaculum the rectocele is hooked up at a point two inches upon the posterior vaginal wall; with bullet forceps pick up the two inferior caruncles, one on each side of the vagina. Have an assistant put the parts upon the stretch, while you outline the mucous membrane to be removed by drawing scalpel from the apex of the triangle down each side of the vagina to the inferior caruncles. Introduce one blade of the scissors through the left caruncle, and cut the mucous membrane loose at the muco-cutaneous junction until the opposite side is reached. The entire thickness of the membrane is then removed. It may be removed in strips, with the scissors and thumb forceps; or, better, by the introduction of a blunt-pointed scissors just anterior to the anus beneath the mucous membrane; pass them well up to the apex of the triangle, and gradually open them as they are withdrawn.

This detaches the membrane, and it should be removed in a single piece. In removing the membrane, never dig under it, but cut toward the part being detached, to avoid wounding the rectum. Check all oozing by the application of hot water, and pressure with sterile gauze. The sutures of silkworm gut are introduced from

above, downward, and should all be in before any of them are tied. When the caruncles are reached, one-third of the suture is buried, one-third passes in front of the denudation, and the last third buried, thus preventing anterior bulging of the perineum. Generally three sutures outside the vagina, including true skin, are quite sufficient to perfectly coaptate the parts.

The sutures should be tied in the manner in which they were introduced, from above downward, and just taut enough to bring the parts into perfect apposition. The sutures are left in position as long as possible without giving trouble. The parts are dusted with iodoform and dry sterile gauze applied, with a T-bandage, the knees tied together, and the patient placed in bed. The sutures are removed by raising the anterior wall of the vagina, clipping, and withdrawing them with thumb forceps.

Modified Perineorrhaphy (Hegar).

The denudation is identical with the foregoing operation. The first suture, which is of chromicized catgut, is introduced at the apex of the triangle and tied; then continued, downward, with lock-stitches, including both edges of the wound for one-third of its length. From this point only the tissue in the center of the denudation is included in the suture, which is

carried down to the muco-cutaneous junction. The second tier of sutures begins at the base of the triangle—muco-cutaneous junction—and includes two-thirds of the remaining denudation, extending upward, with lock-stitch, and also including a small extent of the upper end of the wound; the suture is drawn tightly, closing one-half the triangle. The third tier of sutures are passed from above, downward, with lock-stitch, including the edges of the remaining portion of the wound, and completely closing the denudation, restoring the perineum to its normal state. Pass the needle beneath the last stitch, saw the suture to the middle of the thread, and tie.

Perineorrhaphy—Butterfly Denudation in.

This operation is especially indicated in recent cases with gaping vulva. The denudation is made by drawing a straight line across the posterior vaginal wall with the scalpel, from one caruncle to the other, and dissecting away all the mucous membrane below. If the laceration is extensive, the transverse incision is curved upward, or a tongue of membrane is removed from the apex of the laceration. All oozing is checked by the application of hot water, and pressure with sterile gauze. The sutures in these cases are of silver wire, No. 27, and are passed from below upward, all of which are

passed before any of them are twisted. When the sutures are secured the parts are in perfect apposition. At the end of ten days the sutures are removed, the parts irrigated with bichloride solution, dusted with iodoform, covered with sterile gauze and a T-bandage.

Flap-Splitting Operation--(Tate).

Tate prefers this operation, especially in lacerations of the second degree. With the patient in the dorsal position and everything in readiness for the operation, the rectum is tamponed with cotton, leaving the string protruding from the anus; the index and middle fingers are inserted into the rectum, and, with the scalpel, a transverse incision is made, one inch long and three-fourths of an inch deep, into the recto-vaginal septum; from the ends of the transverse incision to each inferior caruncle an incision is then made, the flap dissected up into the vagina, and turned up like a door upon its hinges. Sutures of silver wire, No. 27, are introduced just within the denuded area, on one side, and brought out just within the denuded area on the other. They are introduced from below, upward, running transversely; generally four are sufficient. When they are all in, the tampon is removed from the rectum and the sutures twisted and left long, or shouldered and

cut short. The only difference in this and the butterfly operation is in this: The flap is turned up and left on, while in the butterfly operation it is removed. The skin wound is accurately approximated with silkworm gut sutures introduced between the wire sutures. Apply iodoform, antiseptic dressing, and a T-bandage. The bowels are moved on the third day, and the sutures on the eighth or tenth.

Operation for Complete Laceration of the Perineum—(Emmet).

In complete laceration of the perineum it is rare for the rent to extend more than two inches up the bowel. The laceration should be repaired as soon as possible; but, if union fails to occur, it is better not to attempt a second operation until involution has taken place. The preparation of the patient, in chronic cases, demands strict attention; as, without the proper clearing of the bowels, by the administration of sulphate of magnesia, from five to seven days prior to operation, the operation may result in failure. Place the patient in the dorsal position, sterilize the parts well, and draw a line with the scalpel, through the mucous membrane, extending from one inferior caruncle to the other, and down to the torn ends of the sphincter, denuding all the space below. The torn ends of

the sphincter are marked by a dimple or depression. They must be drawn up and denuded until the white muscular tissue is well uncovered; otherwise, failure will result in the attempt to restore the muscle to its normal condition. The ends of the sphincter are always found at the end of the rent in the gut. When denuding the rent in the bowel draw its apex up, that the denudation may be rendered easy and more perfect. Beginning at the apex of the laceration in the gut, a No. 1 catgut suture is passed, from within the bowel, out; then, from without, into the bowel, and tied. These sutures are introduced every one-sixth of an inch, and tied, until the sphincter is reached. If the recto-vaginal septum will permit, a continuous row of buried catgut sutures are made from the apex of the triangle down to the sphincter muscle, and tied, which strengthens the septum and prevents fistula.

In restoring the sphincter ani the sutures are of No. 27 silver wire; the first of which, is the crown suture, and is introduced through the skin, in such a manner as to include the sphincter, one-third of an inch from its end, and passing up through the tissues to the apex of the triangle, brought out and reintroduced, passing down the opposite side and finding its exit through the sphincter, one-third of an inch from

its end. A second suture, a little to the outside of the first, is passed in the same way. The remaining sutures are introduced one-fourth of an inch from the edge of the denudation and carried across the perineum, dipping deeply into the tissues, but not through the rectal wall, finding their exit one-fourth of an inch from the edge of the wound. All of the sutures, six or eight in number, are introduced before any of them are twisted. Silver sutures are shouldered over the point of a scissors, before twisting, to prevent their cutting the tissues. In passing sutures the sulci must not be neglected. If preferred, after the first two sutures are introduced, silkworm gut may be substituted. In most cases of recto-vaginal fistula, success may be attained by converting the fistula into a complete laceration and doing the Emmet operation for complete laceration of the perineum.

Perineorrhaphy—(Emmet).

With the patient in the dorsal position, and prepared, as in all plastic operations upon the female genitals, the parts are denuded, as in the butterfly operation. In addition to this, a triangular area extending up the vaginal sulci, with their apices above, is denuded, forming a denudation not unlike the capital M. The parts are irrigated with bichloride solution 1 : 3000

and a crown suture of No. 27 silver wire introduced from below in such a manner that it includes the middle arm of the M. The sulci are then sutured with chromicized catgut, beginning at the apex of the triangle and introducing the suture from above and downward. Withdrawing the needle, reintroduce at its point of exit and pass the suture from below, upward, leaving the sutures long. They should all be introduced before any are tied, which is done from above, downward, and one side completed before the other is begun. After the sulci have been closed the remaining six or eight sutures are passed, as in the butterfly operation, and should be of silkworm gut. These are snugly tied; after which, the crown silver suture is shouldered and twisted. When the suturing is completed, the remaining scar forms the letter Y. Dust with iodoform and apply sterile dressing, with T-bandage. Remove the sutures in eight or ten days, and keep the patient in bed two weeks. I regard this as the most complete operation for laceration of the perineum with which we are familiar. Emmet uses silver wire throughout in this operation.

Colporrhaphy, Anterior—(Emmet).

This operation is demanded in cases of cystocele, urethrocele and urethrocyстоcele. The patient is placed in the dorsal position, the parts

rendered sterile, and the labiae well retracted. An elliptical denudation is made from a point just behind the meatus urinarius for two inches down toward the cervix. The denudation must not be too wide, otherwise tension will be too great and the sutures will slough. Therefore, as soon as the parts to be denuded have been outlined with the scalpel, bring the edges together, note the tension and denude accordingly. A sound is passed into the bladder to hold the mucous membrane forward, facilitating the denudation. The membrane is best removed with scissors and thumb forceps. The sound is left in the bladder until all the sutures have been passed. Sutures of silkworm gut are introduced one-fourth of an inch from the edge of the wound, carried across, completely beneath its base, and made to emerge one-fourth of an inch from the edge of the wound on the opposite side. Each succeeding suture is passed in a similar manner. After all the sutures have been passed the middle one is tied first, to prevent puckering of the wound. The sutures are allowed to remain as long as possible.

Cystocele—Operation for (Stoltz).

In large cystoceles begin the denudation one inch behind the meatus urinarius by snipping off small bits of mucous membrane encircling

the parts to be denuded. A circular denudation is made, the size of a silver dollar, on the anterior wall of the vagina. A needle armed with silkworm gut is introduced at the posterior part of the denundation, one-fourth of an inch from its edge, and a purse-string suture woven around the wound until a point just posterior to the meatus urinarius is reached. The opposite end of the suture is then attached to the needle, and a suture carried around the opposite side of the wound in the same manner, forming a complete purse-string suture around the wound. It is drawn tightly and tied, and left *in situ* three months, unless symptoms arise demanding its removal.

Vesico-Vaginal Fistula—Operation for.

A vesico-vaginal fistula is in its long axis transverse to the vagina, rarely developing until two or three weeks after labor. The majority of fistulæ are situated one-half inch in front of the cervico-vaginal junction. With the patient in the dorsal position and the buttocks elevated—or in the Sims position—the first being preferable—the parts are rendered perfectly aseptic; after which, either a Sims speculum or Pean's retractors are introduced into the vagina, bringing the fistulous opening into view. The surgeon hooks up each end of the fistula, plac-

ing the parts upon the stretch; and, with the scissors or scalpel, cuts out a complete ring, one-third to one-half an inch wide, encircling the fistulous opening and including all the tissues down to the mucous membrane lining the bladder. A catheter should be introduced into the bladder, holding any protruding mucous membrane out of the wound. This also facilitates the introduction of the sutures.

If there is tension on the fistula, cut all vaginal bands loose; otherwise, the stitches will slough. Either silver wire, No. 27, or silkworm gut sutures are introduced one-fifth of an inch apart antero-posteriorly, passing just outside the mucous membrane of the bladder, and crossing the wound to the opposite side, then, introduce the needle just outside the mucous membrane, carrying it out through the tissues one-fifth of an inch from the edge of the wound. The first suture should be passed across the center of the wound, and held by an assistant while the remainder are introduced.

Edibole's speculum is one of the best for holding the vagina open during the introduction of the sutures. After tying the sutures, fill the bladder with water, to see if it leaks.

In performing this operation great care is taken not to wound the ureters. The fistulous opening is generally situated in the triangle

formed by the ureters as they enter the posterior wall of the bladder. Kelly, of Baltimore, places his patient in Trendelenberg's position; introduces an endoscope, locates the ureteral openings and passes catheters, leaving them in until the operation is completed, thus preventing injury to the ureters and rendering them easily seen and felt. Leave a self-retaining catheter in the bladder. Keep the patient in bed for eight days, and the bowels open.

Vesico-Uterine Fistula—Operation for (Emmet).

This condition is due to a laceration of the cervix extending into the bladder; the laceration, healing below, leaving the fistulous tract open. The cervix is split up to the opening, the edges being denuded, and the whole brought together as in a simple case of trachelorrhaphy, exercising great care with the upper sutures. If this fails, and there is too much discomfort to the patient, do a vaginal hysterectomy, and close the fistula in the bladder, as for simple fistula. The recto-vaginal fistula, if very small, is denuded and sutured as in vesico-vaginal; otherwise, it is laid open through the sphincter ani, and an operation done for complete laceration of the perineum.

Urine Incontinence—Operation for (Gersuny).

In cases of incontinence of urine in the female, medicinal means having failed, the following operation may be done after Gersuny's technique: The meatus urinarius is picked up with mouse-toothed forceps, and a circular incision carried completely around it through the mucous membrane; then, with a sharp-pointed knife, the urethra is dissected out, intact, for one and one-half inches. It is then twisted upon itself to form a sphincter for control of the urine. Pass a sound to ascertain tautness of the urethra after twisting; if too much strained, slightly relax; if too loose, an additional twist is necessary. It is then stitched to the mucous membrane at the meatus, with interrupted sutures, and dressed with sterile gauze.

Curettage.

Place the patient in the dorsal position; put on Clover's crutch, and draw the buttocks well over the end of the table, with a Kelly pad under the hips, so that it will drain into the pail beneath the table. With the parts thoroughly aseptic, the index and middle finger of the left hand are introduced to the cervix, making pressure on the perineum. A volsella forceps is passed and made to seize the posterior lip of the cervix,

which is drawn well out of the vaginal outlet (unless adhesions exist). The cervix is held firmly, a Wylie's dilator introduced through the internal os, and the cervix well dilated. If this instrument proves inadequate to the task, either Goodell's or Wathen's dilator should be substituted and the dilatation completed. The uterus is then swabbed out with a creosote solution 1 : 3 of water, and with a sharp curette, held in the pen position, the uterus is curetted; beginning at a selected point and working all the way around, that none of the endometrium may escape the instrument. No force is employed in the operation, as the curette might perforate the uterus. After curetting, the uterus is irrigated with sterile water, again swabbed with the creosote solution, and packed with a narrow strip of iodoform gauze, one end of which, is left suspended from the cervix, facilitating its removal.

Richelot, of the Hospital St. Louis, Paris, uses, instead of the gauze, a crayon, composed of white wax melted, into which, powdered iodoform is stirred, allowed to cool, and moulded into crayons of the desired shape and size, and kept in bottles for use. A strip of iodoform gauze is loosely packed in the vagina, and allowed to remain a few days, when it is removed along with the gauze from the uterus. If the iodoform

crayons are employed no attempt is made to remove them.

Trachelorrhaphy (Emmet).

This operation is demanded in lacerated conditions of the cervix—unilateral, bilateral, or stellate. With the patient in the dorsal position, hips resting on a Kelly pad, and the parts rendered aseptic; the fingers are introduced to the cervix, along which, a volsella forceps is passed made to seize the anterior lip of the cervix, and the uterus drawn to the vaginal outlet and held by an assistant, while the surgeon does a thorough curetting. The Sims speculum may be introduced, and the anterior lip of the cervix seized and drawn down; when the posterior lip of the cervix is also grasped with another volsella, and the laceration held wide open. The edges of the laceration are then denuded, taking care to leave a strip of mucous membrane along the center of each lip to form the cervical canal. The angles of the laceration are split up and all of the cicatricial tissue removed: otherwise, union will not be perfect.

Sutures of silk-worm gut, three or four on a side, beginning at the upper angle of the wound, are quite sufficient. Each is passed one-fourth of an inch from the edge of the laceration, and from the vaginal portion of the cervix through

the thickness of the lip, emerging in the edge of the remaining cervical mucosa. It is carried across to the edge of the opposite lip and introduced through the edge of the cervical mucous membrane, through the thickness of the lip, and made to emerge on the vaginal surface one-fourth of an inch from the edge of the rent. The other sutures are introduced in a similar manner, care being taken not to pucker one lip upon the other. The sutures are snugly tied from above downward. Any gaping points between the sutures are closed with fine superficial silk stitches. The vagina is irrigated after the operation, a strip of iodoform gauze passed into the uterus and left protruding from the os. The vagina is then loosely packed with iodoform gauze, which is removed at the end of a few days, along with the strip from the cervix. The vulva is protected with sterile cotton or gauze and a T-bandage. The patient must remain in bed for three weeks. The bowels should be opened every other day by enemata of soap and water, with an occasional laxative. The urine is drawn only when necessary. The stitches are allowed to remain for two months. If the vaginal outlet has been operated upon they may be left for three months. The sutures are removed by placing the patient in Sims' position and retracting the perineum with a Sims specu-

lum, seizing the end of the suture with a forceps, clipping one side and withdrawing it. Make a digital examination to ascertain if all the sutures have been removed. Sexual intercourse should be interdicted for four months.

Trachelorrhaphy—(Shroeder).

This operation is demanded in every case where the cervix is so indurated that all of the diseased tissue can not be removed by the ordinary Emmet operation. It is also applicable to cases of endocervicitis. Everything being in readiness, the uterus is drawn down, and swabbed with creosote and water 1 : 3, well curetted, irrigated, and again swabbed with the creosote solution. Both the anterior and posterior lips of the cervix are seized with volsella forceps, and a lateral cut made with the scissors for one inch up each side of the cervix. Make traction on the volsella, and plunge the scalpel into the end of the posterior lip and carry the knife around, cutting the tissues loose as far as the lateral slit extends ; after which, the half cone is cut off, leaving only the outside shell, forming a flap. The anterior lip is treated in the same manner. Sutures of silkworm gut or chromicised catgut are introduced with a Dwyon or Peaslee curved needle, from within the cervical canal, out through the flap and tied, turning the

flaps in upon themselves. After the sutures have all been introduced and tied, the two lateral slits are closed with catgut sutures. A strip of iodoform gauze is introduced into the uterus, rendering the cervical canal patent. Irrigate the parts and apply iodoform gauze dressing. The vulva is protected with sterile gauze, cotton and a T-bandage.

Cervix—Amputation of.

With the patient prepared for operation, the lips of the cervix are seized with a stout volsella forceps, drawn down to the vaginal outlet, held steady, and the uterus swabbed with creosote and water 1 : 3, thoroughly curetted, irrigated and again swabbed with the creosote solution. A circular incision is then carried completely around and through the cervix one-half to three-fourths of an inch from the end. Either the scalpel or the curved scissors may be used for this purpose. Care is exercised not to wound the bladder, as it is often very low down upon the cervix. If the cervix is very much hypertrophied, considerable hemorrhage is encountered. The first two sutures—one anteriorly and one posteriorly—pass through the vaginal mucous membrane of the cervix, cross the end of the stump, and through the mucosa of the cervical canal, which are tied, drawing the mucous membrane over

the end of the stump. The remaining sutures of silkworm gut are passed from the vaginal portion of the cervix through the entire thickness of the cervical tissue, emerging in the cervical canal. They are tied as introduced, and are from eight to ten in number. They are removed in three weeks. A strip of sterile gauze is passed into the uterus, and the vagina packed lightly with iodoform gauze, which is withdrawn, along with the strip from the uterus, at the end of five days. The vulva is protected with gauze, cotton, and a T-bandage.

Symphyseotomy — (Ayers).

While symphyseotomy is not a gynecological operation; for reasons of my own, I deem it expedient to speak of it in this connection. Thanks to the labors of Dr. Ayers, of New York, the operation of Morrisani has fallen into disrepute. This operation is done by making a long cut over the pubis, exposing the joint. Then, with the Galbiotti knife passed beneath the joint, it is cut through from below upward, leaving a large, ugly wound, liable to infection.

The Ayers' technique is as follows: Place the patient in the dorsal position, buttocks drawn well over the end of the table, and the knees supported by two assistants. A sound is introduced into the bladder, the urethra pushed over

to the right side, and a small opening made in the median line, midway between the clitoris and the meatus urinarius. Into this opening pass a curved probe-pointed bistoury back over the pubis; and, with the left index finger in the vagina, passed up behind the pubis to the point of the knife, the joint is cut through with a sawing motion from above downwards. Keeping the finger on the point of the knife protects the vaginal mucosa from injury. This allows a separation of the pubic bones of about two inches. After delivery, the patient is made as nearly sterile as possible, dry gauze applied to the vulva, and the parts held in apposition by the application of adhesive strips, tightly applied; over which, is placed a close-fitting bandage. The patient is placed upon a cot bed, that, as her hips sink, the sides of the cot press against them, retaining the joint in close proximity until union has taken place. About forty days are required for the joint to become solid.

Uterus, Displacements—Treatment of.

The main displacements of the uterus are anteversion, anteflexion, retroversion, retroflexion and prolapsus.

Anteversion of the uterus is a falling forward of the fundus, and pointing backward of the cervix: and is due to some inflammatory trouble

in or about the uterus. Treatment should begin with hot vaginal injection and iodine to the fornices, followed by boroglyceride or ichthyol tampons behind and around the cervix. This is continued until all inflammation has subsided and the uterus is movable; after which, a pessary suitable to the case may be worn (Emmet's). In very annoying cases, I would suggest, when the uterus has been relieved of all inflammation and is movable, it be suspended by ventral fixation.

Anteflexion of the uterus is a bending forward of the fundus upon the cervix; and is most frequently observed in shop girls. These patients have infantile uteri. Treatment—first treat all existing pelvic inflammation with hot vaginal douches, counterirritation, with iodine and glycerine or ichthyol tampons. When the inflammation has subsided, cleanse the vagina and cervix, and dilate the cervix slowly by constantly kneading with the dilator; then curette the uterus and pack with iodoform gauze. The uterus is irrigated and repacked twice a week for two or three weeks, or longer. If this treatment fails, more radical measures are resorted to. The uterus is drawn down, curetted and irrigated. Then a scalpel is introduced into the uterine canal, and the anterior wall of the uterus, where the seat of trouble lies, is incised. The knife is then turned over and the posterior lip of the cervix

cut through, and a Wylie's or Outerbridge's drainage tube inserted, thus straightening the uterine canal and allowing the escape of blood without pain.

Retroversion and Retroflexion.

Retroversion is the dislocation of the fundus of the uterus, backward, with the cervix pointing directly forward in the axis of the vagina. Retroflexion is bending backward of the uterus upon itself, without changing the position of the cervix. The uterus is more or less congested and enlarged.

Relieve all inflammation with hot vaginal douches, and counterirritation with iodine and glycerine tampons; then replace and retain the uterus with tampons. With the patient in the dorsal position, introduce the finger into the vagina or rectum, and raise the fundus until it can be grasped by the external hand and brought forward. If the body of the uterus is very sensitive, it may be replaced by the introduction of the sound, with its concavity backward, the handle describing the arc of a circle from behind, forward; gradually depressing the handle of the sound over the perineum, and throwing the uterus forward. To replace the pregnant uterus, place the patient in the genupectoral position; draw the cervix down with volsella forceps,

and press the fundus forward with the finger in the rectum. If the uterus is retroverted, in connection with the retroflexion, the flexion is not removed, but the retroversion is relieved. After reposition the uterus is retained in its position by pessaries or an operation—Alexander's operation, hysterorrhaphy or vaginal fixation.

Prolapsus uteri is, according to Thomas, of three degrees: When the uterus has sunken in the pelvis; when the cervix is at the vaginal outlet; when a part or the whole of the uterus lies between the thighs. It is due to a relaxed condition of the uterine ligaments and the surrounding tissues, combined with intra-abdominal pressure. These may be superinduced by strains, lifting, falls, etc. Treatment—pessaries to support the uterus, and operation, perineorrhaphy, anterior colporrhaphy, with amputation of the cervix, combined with Alexander's operation, ventral hysterorrhaphy or vaginal-hysterectomy. The different degrees of treatment are decided according to the degree of prolapsus.

Cervix, Stenosis of—Treatment.

The uterus is drawn down and well dilated under anesthesia; then swabbed out with creosote and water, 1:3, after which it is thoroughly curetted, and drained with Wylie's or Outerbridge's uterine stem. Stenosis of the cervix,

generally at the internal os, causes dysmenorrhœa and its allied ailments.

Pus tubes may be removed along with the ovaries, *per vaginam*, by opening Douglas's cul-de-sac; drawing the uterine appendage down, ligating and cutting them loose; or the abscess is torn into with the finger and irrigated with peroxide of hydrogen, followed with normal salt solution, and drained by leaving in a strip of iodoform gauze. The danger in removing the tubes is rupture of the sac. Although Gusserow states that in many chronic cases the pus has become non-infectious, this is not to be relied on. In cases of large abscess, Winter suggests aspiration of the sac before attempting to dissect it loose. If in connection with pyosalpinx, there is an endometritis, Pean and Segon advise vaginal hysterectomy, with removal of the ovaries and tubes. Dührssen says that occasionally laparotomy has to be done after vaginal hysterectomy for the removal of the ovaries and tubes. Martin, of Berlin, recommends conservative surgery of the ovaries. If the ovaries are relatively sound, the whole, or a portion of them, should be left, in order to retain the sexual power and menstruation. In resection of the ovaries, as first described by Shroeder, one can suture up the ovary with fine catgut sutures after incision.

Extra-Uterine Pregnancy and Intra-Abdominal Hemorrhage—Dührssen.

Under this head may be mentioned retro-uterine hæmatocele and hæmatoma of the broad ligaments; both of which are generally due to extra-uterine pregnancy. Treatment—open into the blood sac, check hemorrhage, pack with gauze, and drain, if necessary. Intra-abdominal hemorrhage in a woman is nearly always due to a ruptured tubal pregnancy, and demands prompt treatment. The hemorrhage may be acute, profuse and fatal within a few hours. There is progressive quickening of the pulse, faintness, sickness, paleness of the lips and face, tenderness and swelling of the abdomen, the mind remaining clear.

The menses are usually suppressed for six or eight weeks, followed by sudden acute pain, with some loss of blood. On introducing the finger into the vagina the pouch of Douglas is found to be filled with a soft fluctuating mass.

The hemorrhage in other cases may be acute, but not profuse, and intermittent; this is the most common form. A woman is taken with sudden, acute abdominal pain, faintness and pallor; but, in a few hours, feels better, and may get up and leave her room. In two or three days the symptoms return, and again subside, as

before. Vaginal examination reveals a tubal sac behind the uterus, and, spreading from this, a mass occupying one side of the pelvis. The vaginal vessels beneath the mass are often prominent and pulsating. During this time an irregular hemorrhage from the uterus is in progress. The uterus is not very much, if any, enlarged; but where the above symptoms present in a woman of child-bearing age tubal pregnancy almost certainly exists.

The treatment is essentially operative. The abdomen is opened, the uterine end of the tube and broad ligament tightly ligated, and the tube removed; or better, draw the uterus down and open through Douglas' cul-de-sac; turn out the clots, draw down the tube, and ligate it close to the side of the uterus, and cut it loose. The cavity is irrigated with normal salt solution to remove all clots, the uterus replaced and the vaginal vault closed with, or without, a small gauze drain, as indicated.

Carcinoma of the Uterus—Treatment of.

While any portion of the uterus is liable to carcinoma, the cervix is most frequently the seat of this disease. If the case is seen before it becomes inoperable, vaginal hysterectomy should be done without delay.

If radical measures are contraindicated, palliative treatment is the only resort. Thoroughly

curette all of the diseased tissue away, and cauterize with a Paquelin cautery. The foul discharge may be partially controlled with antiseptic douching, creoline or pot. permanganas. Relieve pain with morphia, and attend to the general health of the patient.

Endometritis.

Endometritis is both acute and chronic, and may be confined either to the cervix (cervical endometritis), or to the body of the uterus (corporal endometritis); or the entire uterus may be affected. Treatment for acute endometritis—light diet, rest in bed, keeping the bowels open, and hot-water douches containing boric acid. If necessary, morphia may be given to procure rest. In treating chronic endometritis, open patient's bowels, look after the general health, and use hot vaginal douches for a few days. Then draw the uterus down, swab out with creosote, 1:3; dilate the cervix and thoroughly curette the uterus and cervix, swab again with the creosote, and pack with a strip of iodoform gauze. If the cervix is lacerated, trachelorrhaphy must be done.

Urethral Caruncle—Treatment of.

Irritable urethral caruncle is a very distressing malady, and must be differentiated from venereal

warts, urethral polypi, and prolapse of the urethral mucous membrane. In treating these growths, including the caruncle, cocaine the parts, cut the growth away and touch the base with the actual cautery; they may be ligated before cutting, rendering hemorrhage less profuse.

Inflammation of the Vaginal Outlet.

Inflammatory conditions of the vulvo-vaginal outlet are treated both locally and constitutionally. The parts are kept clean and bathed in such astringents as the surgeon may advise, with frequent hot douching and dusting with suitable powders; always accompanied by complete rest and strict attention to the general health of the patient.

Uterus, Vaginal Fixation of—(Meckenrodt).

This operation is applicable in many cases where a vaginal operation should be undertaken, and in retroflexions with adhesions, when a pessary can not be tolerated; also, where the patient can not remain under the care of the physician while wearing the pessary; and in cases that relapse into a depressed hysterical condition (Dührssen). The same author states that vaginal fixation should be done in all cases of retroflexed or retroverted uteri. With the patient in

the dorsal position and the parts sterile, the perineum is retracted with Pean's perineal retractor, and the anterior lip of the cervix is seized with a volsella forceps, the uterus drawn down, irrigated, and curetted. The bladder is pushed forward and upward, with a small catheter introduced into that organ; and an incision, half an inch long, is made transversely at the point where the anterior vaginal wall joins the cervix: the upper margin of the wound is seized with a volsella and drawn strongly upward; the incision is then deepened and lengthened on both sides with the curved scissors by one-fourth of an inch. This extension must be done in close proximity to the uterus, avoiding injury to the ureters. The bladder is bluntly dissected loose from the uterus with the index finger; a curved sound is passed into the uterus and the fundus pressed against the operator's left forefinger, which is pressed into the vaginal wound, unless adhesions prevent; two transverse silk-worm gut sutures are passed high up through the vaginal flaps, the anterior surface of the uterus, and out through the vaginal flap on the opposite side, and tied. In cases with diseased adnexa, the uterus is drawn down and the adhesions, with the tubes and ovaries, are divided upon a director with a Paquelin cautery; also, puncture the cystic follicles of the ovary with

the cautery and return the uterus, tubes, and ovaries; after which, two silkworm gut sutures are passed and tied, retaining the uterus in an anteverted position; the vaginal wound is closed with catgut sutures. The ovaries and tubes can be removed through this opening, although the posterior route through Douglas' cul-de-sac is preferable.

Technically, ventrofixation is easier to do, but vaginal fixation is to be preferred from every other standpoint. Many cases of retrodisplacement are cured by this operation, when other means have failed.

Dressing—consists of iodoform, dry sterile gauze, and a T-bandage.

Alexander's Operation.

Place the patient in the dorsal position and render the parts perfectly sterile by shaving and scrubbing with green soap; then, irrigating with alcohol, ether, and bichloride solution, 1:3000. This operation is done to bring the fundus of the retroposed uterus forward into its normal position, although it is not applicable unless the uterus is freely movable.

Alexander's operation is, in many cases, very difficult to perform; consequently, should the surgeon fail, after repeated searchings, to find

the round ligament, he should neither be surprised nor discouraged.

Make an incision from the spine of the pubis, half an inch above Poupart's ligament, two inches in length, over the inguinal canal exposing the external oblique muscle. When the skin is incised and the external oblique ring is reached, a small lump of fat bulges into the wound, nearly always containing the round ligament, accompanied by the small genital branch of the genito-crural nerve. When the ligament has been separated from the surrounding tissues and drawn down, it is covered with a sponge, while the opposite side is treated in a similar manner. The uterus is then thrown forward by a sound passed into the uterus and manipulated by an assistant. The ligaments are drawn down until the uterus is anchored snugly against the abdominal wall. The ligaments are held by an assistant in the long axis of the wound, while the surgeon passes silkworm gut sutures one-fourth of an inch from the edge of the wound, to and through, the round ligament and out through the opposite side, one-fourth of an inch from the edge of the wound, and ties. Generally four sutures on each side are quite sufficient. Pass a Cleveland ligature-carrier into the lower end of the wound, carry it beneath the skin and superficial fascia, downward, for two

inches, and push it through the skin; on withdrawing the instrument a double silk ligature is drawn through the opening. The ligature is looped over the end of the round ligament, which is drawn through the newly formed opening; its lower end is stitched to the skin and cut off smoothly. A well-fitting pessary is worn for several months after the operation. A sound passed into the uterus and manipulated, renders the ligaments easier to find. Hernia frequently follows Alexander's operation; therefore, the opening into the peritoneal cavity should be thoroughly closed before anchoring the ligaments. Dressing—iodoform, sterile gauze, cotton, and bandage.

Uterus—Ventrofixation of.

Hysterorrhaphy is called for in cases of retroversion, retrollexion, or prolapsus of the uterus. Render the field of operation perfectly sterile, and place the patient in the dorsal or Trendelenberg's position; empty the bladder and make an incision two inches long midway between the umbilicus and the pubis; open the peritoneum and push the bladder to one side; the uterus is then located, and its fundus grasped with the volsella forceps and drawn up to the lower end of the wound. The anterior surface of the uterus is scraped with the scalpel, and two or three

sutures of chromicised catgut passed through, the edge of the rectus muscle, then through the anterior surface of the fundus of the uterus and out through the rectus muscle of the opposite side: the uterus is drawn well up against the lower angle of the abdominal wound, the sutures tied and cut short, and the belly closed and dressed in the usual manner.

Leopold passes sutures of silkworm gut through the entire thickness of the belly wall, through the anterior surface of the uterus, and out through the belly wall on the opposite side. He then closes the belly, and while an assistant, with his finger in the vagina, holds the uterus well up, he ties the two or three sutures, anchoring the uterus to the lower angle of the wound. Dress—with dry gauze and abdominal bandage. It is advisable that a well-fitting pessary should be worn for three months after operation.

Hysterectomy, Vaginal—Ligature in.

In the light of modern gynecology, this once popular operation is almost abandoned for the clamp; however, for the benefit of its few admirers, I will give the technique.

The patient is rendered sterile, placed in the dorsal position, with the hips resting on a Kelly pad, and drawn well over the end of the table. The knees are separated, and the legs supported

by the leg-rests attached to the end of the table, or Clover's crutch, and steadied by assistants.

The index and middle fingers of the left hand are passed over the perineum into the vagina, separating the labiæ and depressing the perineum, along which a volsella forceps is carried, and made to seize both lips of the cervix. The uterus is drawn down to the vulva, and, with the scalpel, or, better, the curved blunt scissors, cut through the vaginal mucous membrane until the uterine tissue is exposed—which looks white and fibrous—at right angles to the cervix one-fourth of an inch from its end, and extending completely around it. The bladder and anterior vaginal wall is bluntly dissected loose from the uterus; after which, the posterior vaginal wall is dissected loose. When the dissection is difficult the blunt-pointed scissors are used to snip the bands of adhesion across the anterior aspect of the uterus. Care should be exercised that the peritoneum is well dissected loose when the anterior fornix is opened. With the cervix well dissected out, the patient is placed in Trendelenberg's position, the cervix drawn upon, and steadied by an assistant, while the surgeon passes the index finger of the left hand into Douglas cul-de-sac: and, hooking it over the broad ligament, draws it down: and, at the same time, with a Cleveland ligature carrier, a strong silk

ligature is passed close to the cervix from above, downward, and high enough to include the uterine artery. With the finger in the vagina, push the ligature one-fourth of an inch out from the cervix and tie tightly, controlling all bleeding from the uterine artery. The tissues included in the ligature are cut loose with scissors close to the cervix. In passing the first ligature on each side, great care is exercised not to include the ureters. The succeeding ligatures are applied in the same manner as the first, allowing each one to reach further out on the broad ligament. The tissues are cut loose, and the uterus drawn down as the ligatures are introduced, until they have all been applied, generally four on each side being quite sufficient. The ends are left long to facilitate their removal. The after treatment consists in applying a strip of iodoform gauze to the stump on each side, then packing the pelvic cavity with gauze, leaving one end projecting from the vagina to facilitate its removal. This should be begun in three days by drawing a portion out every day until all is removed. The ligatures are removed when they will come away without force. The vulva is protected with gauze and a T-bandage. A self-retaining catheter is left in the bladder for a few days. The patient is allowed no morphine, drink or food for several hours after operation;

then only teaspoonful sips of Vichy water for a time. When all indications of nausea have subsided, liquid food is allowed.

Hysterectomy, Vaginal—(with Clamps).

It is my purpose to give the technique of vaginal hysterectomy, with the use of the clamps, as practiced by the French surgeons; of whom I will mention, Pozzi, Segon, Pean and Gustave Richelot, the last of whom I shall follow, step by step, in this description.

The patient is placed in the dorsal position, with hips resting on a Kelly pad, and drawn well over the end of the table. The parts are well scrubbed with soap and water or lysol, two-per-cent solution, shaved, and irrigated with bichloride solution 1 : 3000. The knees are then separated, and held up by the leg-rests attached to the end of the table, or by Clover's crutch, and steadied by assistants. The index and middle fingers of the left hand are passed over the perineum into the vagina, separating and depressing the perineum. A volsella forceps is introduced into the vagina, and made to seize both lips of the cervix, and the uterus drawn down to the vaginal outlet. With a curved blunt-pointed scissors, a circular incision is carried completely around the cervix to uterine tissue—which looks white and fibrous—one-

fourth of an inch from its end. The cervix is held steadily, while the bladder and anterior vaginal wall are bluntly dissected loose from the uterus; after which, the posterior vaginal wall is bluntly separated from the uterus. If the dissections are difficult, the adhesions across the anterior aspect of the uterus are cut loose with curved scissors. Great care is taken that the uterus is closely hugged during the entire dissection. With the cervix well dissected out, both anteriorly and posteriorly, an anterior vaginal retractor is introduced, and held well up against the pubis, holding the bladder and anterior vaginal wall out of the way, followed by the introduction of the posterior retractor, held hard against the perineum.

The hysterectomy clamps are introduced, astride the broad ligament on each side of the cervix, high enough to include the uterine artery; and in such a manner that their points are some distance up on the sides of the cervix. As they are clamped they are worked off to the side of, and one-fourth of an inch from, the cervix, and firmly locked. That portion of the broad ligament included in the clamp is cut loose close to the cervix on both sides, and, with the scissors, the cervix is split laterally up both sides. Then the posterior half of the cervix is cut off, high up, and while the anterior lip is drawn down, it

is cut halfway through with scissors, on the left side at its base. The uterus is seized with a volsella and the anterior lip completely cut loose. The stump is then seized with a second volsella, and, with scissors, the anterior wall of the uterus is split from before backward. As the uterus is split it is gradually drawn down by frequent grasps with the volsella. When the fundus is reached, the index finger of the left hand is passed over behind it and the uterus completely delivered, when it is cut through its posterior wall, dividing it into halves. The left half of the uterus is drawn well down, bringing the tubes and ovaries into view; these are dissected out with the fingers; after which, a long-billed hysterectomy forceps is applied astride the broad ligament, above the tube and ovary, and from above, downward, including the ovarian artery. The left half of the uterus, the tube and the ovary, are cut loose to the distal side of the forceps. The right half is treated in a like manner. All bleeding points are checked with clamps. If there is a fibroid present, it is removed by morcellation. The after treatment is as follows:—The vagina is well packed with iodoform gauze, exercising care to pack well around the forceps. The vulva is protected with sterile gauze and a T-bandage. A self-retaining catheter is left in for a few days. At the end of

forty-eight hours the gauze is removed from the vagina, followed by removal of the forceps, generally under anesthesia.

After removal of the forceps the vagina is re-packed with iodoform gauze. No opiate, food or drink is allowed for several hours after operation, when Vichy water in 5j doses may be given. This to be followed by tea and toast for a time.

Hysterectomy, Abdominal—Laparotomy.

With the patient upon the table, and the field of operation made perfectly sterile, and the bladder being emptied, an incision is made in the median line of the belly, of sufficient length to enable the surgeon to work with ease; care being taken that the incision does not extend lower than a point two inches above the pubis. When the peritoneum is reached, it is picked up between thumb forceps and incised; introduce one or two fingers, and, with scissors, extend the peritoneal opening full length of the abdominal wound. The fingers are introduced and the uterus located; its fundus is then seized with a volsella forceps and drawn up into the wound. the bowels are packed away with sterile gauze pads. The broad ligaments are clamped on both sides with hysterectomy forceps, in such a manner that the ovarian artery is included. The

portion of broad ligament included in the forceps is cut loose; the uterus is drawn backward and a transverse incision, three fourths of an inch above the attachment of the bladder to the uterus, is made; the tissues are cut through to the uterine tissue, and the bladder and anterior vaginal wall are bluntly dissected off down to the vagina, care being exercised to keep close to the uterus during the dissection. The uterus is then drawn forward and upward, and a transverse incision is made, just above Douglas' cul-de-sac, and dissected loose from the uterus with the finger. The uterus is now free, save for the remaining portion of the broad ligaments on both sides, in which are imbedded the two uterine arteries, and just behind them the ureters. The uterine arteries are either ligated or clamped with hysterectomy forceps, avoiding the ureters; after which, the uterus is cut loose and removed. The vaginal stump is closed with catgut sutures, not including the peritoneum; then the peritoneum is stitched over the vaginal stump. Strong catgut sutures are passed, in such a manner as to include the uterine and ovarian arteries, and tied, and, with a continuous suture, the stumps of the broad ligaments are securely closed, and covered over with peritoneum; rendering the stumps entirely extra-peritoneal, thus preventing adhesions.

The vagina is packed with iodoform gauze, and the abdomen closed in the following manner, unless sepsis is feared, when drainage is used: The sponges are removed and all oozing stopped, the great omentum drawn down over the bowels, and a curved needle, armed with cat-gut suture, is passed through the peritoneum, at the upper angle of the wound, and tied, leaving the end long. Then, with a continuous suture, the peritoneum is closed to the lower angle of the wound; and, with the same continuous suture, the abdominal muscles are closed to the upper end of the wound, tied and cut off: care is exercised to bring the muscular sheaths in contact. The skin and the subcutaneous cellular tissue are closed by the introduction of a silkworm gut suture every one-third of an inch, all of which are introduced before any are tied. Dressing—consists of dusting with iodoform, gauze, cotton, and tight abdominal bandage.

This operation may be simplified by opening the anterior and posterior vaginal fornices, dissecting the anterior vaginal wall, bladder, and rectum loose from the cervix, and clamping the uterine arteries before the belly is opened, allowing the clamp to remain in the vagina for forty-eight hours, guarding against secondary hemorrhage. When the arteries have been clamped, the operator proceeds with the abdom-

inal portion of the operation as above given. This technique is applicable in all cases where a laparotomy is demanded.

MAJOR OPERATIONS—TREATMENT OF.

The following is an extract from the American Text Book of Gynecology:

“The first thing to be considered after an operation is, perfect rest of body and mind. If a laparotomy, the patient is placed upon her back and allowed to remain in this position for a few days, until the bowels move. If a glass drainage tube has been used, she must remain in this position until it is removed. Any change of the patient's legs should be made by the nurse: when the knees are drawn up they are supported by pillows. The gown and bed linen under the patient's back should be kept perfectly smooth from the beginning. Any change from the dorsal position is to be deplored from every standpoint.

“Neither drugs, food, nor drink should be allowed to pass the patient's lips until all vomiting following the operation has ceased, which is from twelve to twenty-four hours. After vomiting has ceased, a small spoonful of soda water

may be allowed every fifteen minutes, testing the ability of the stomach to retain and absorb it, gradually increasing the amount for twelve hours, when the patient may be allowed a dessert-spoonful every fifteen minutes. The nurse must keep the mouth clean by swabbing it with a wet cloth. When thirst is intolerable, give an enema of ξ ij to ξ iv of hot water into the colon every three hours. Indeed, thirst is regarded as a great desideratum, as the blood draws upon the accumulated serum and blood in the pelvic cavity.

No food should be allowed for two days, except in unusual cases, when it may be given in the form of an enema. Stimulants may be employed in the same way. Not until the stomach has become tolerant of drink should food be allowed of a fluid character. Buttermilk, ξ ss every two hours, is most acceptable to the majority of women. Beef extracts and soups may be alternated with the buttermilk. Any soft diet suitable for the sick may be gradually introduced. The bowels should be moved as soon as possible after abdominal sections, usually in forty-eight hours; and I would suggest hypodermic injections of two grains of sulphate of magnesia. The tablets may be bought of Parke, Davis & Co. in tubes of twenty-five each. As soon as the bowels have moved, the appe-

tite increases, but for the first four days after operation the patient will not care for solid food. After that time she may be allowed solid food in moderation. The condition of the bowels and the pulse is the best criterion of the progress of the patient.

“ If the bowels have moved well at the end of forty-eight or sixty hours, and the pulse is below 100, the patient is convalescent; otherwise, it may prove a serious matter. The one object, then, is to get the bowels open. As soon as vomiting has ceased after the operation, calomel, in grain doses, should be administered every hour until eight or ten doses have been given. This is followed by a Seidlitz powder or Epsom salts, every two hours, until they act freely. When flatus is passed or the saline is rejected, an enema of Oij of soapsuds, containing a teaspoonful of turpentine, is resorted to, and is repeated in two hours if necessary. If the salts can not be retained, substitute the comp. liquorice powder; or, in desperate cases, croton oil. If the bowels have not been moved by the third day, and the pulse is 130, it is the exceptional case that recovers. All efforts to get the bowels to respond should be continued as long as the patient is alive. Often apparently hopeless cases are relieved at the last moment

by securing an action. A daily movement should be maintained.

• If serious injury has been done to the intestines in breaking up adhesions, it is best to give morphine hypodermically, or opium suppositories, in sufficient quantities to keep the intestine quiet until the parts are strengthened with lymph, which is about the fifth day. Then small, repeated doses of sulphate of magnesia are given, followed by enemata of soapsuds and water, taking care not to over-distend the bowels. If damage has been done to the small intestines, little difference need be observed in the after-treatment, except in the administration of purgatives, which should not be given until the third day. When the damage is to the sigmoid flexure or to the rectum, as is generally the case, stitches can not be well applied, and unless great care is exercised, irreparable damage may be done when the bowels move; therefore the bowels should not be held in check too long; otherwise, the colon and rectum become clogged with scybulous matter, which may cause the partially healed rent to give away. When the bowels have once moved, a daily action must be maintained.

• The urine is drawn with a catheter only when absolutely necessary. The patient generally voids her urine if left for several hours after the operation: the bedpan should be occa-

sionally offered her, and every effort made to aid her in passing the urine. A small stream of warm water, squeezed from a sponge and allowed to run down over the meatus, often causes the urine to flow.

“The parts should always be exposed when the catheter, which is of soft rubber, is used. The parts should be rendered sterile, as well as the catheter, before it is passed, thus preventing a septic cystitis.

“If, during the operation, the bladder has been wounded, a self-retaining catheter must be left in for four days, to which, is attached a rubber tube for draining the urine into a vessel beneath the bed. After this the bladder should be catheterized six times in twenty-four hours, for a week or ten days, when this may be discontinued.

“If cystitis develops soon after operation, the bladder should be kept empty, and irrigated twice a day with a solution of permanganate of potash (not strong enough to cause burning), until the bladder feels distended; the siphon is lowered, and the solution allowed to drain away. This is repeated two or three times. After a few irrigations the patient is more comfortable, and a cure quickly follows. The urine, in the meantime, is rendered as nearly sterile as possible.

•• The amount of urine, after operation, is always small for a few days; but if uræmia develops, as it often does when the patient is subject to kidney disease, the case is serious, and nothing short of prompt action gives any hope of relief.

•• Purgation, diuretics, heat and local bleeding are all indicated. Croton oil for purgation, cocaine for diuresis, leeches and cupping over the kidneys for bleeding, and dry heat applied about the parts, are the chief remedies.

•• Warm sponge baths should be employed every day, from the time the bowels first move, after operation. The hair and teeth should receive attention from the beginning.

•• Flatulence is the most distressing symptom encountered in the after treatment of abdominal surgery; and is present, more or less, in all cases. Flatulence alone is capable of producing death; therefore no effort should be spared for its relief. It generally does not appear under twelve or twenty-four hours, in the majority of cases; if the bowels can be evacuated within forty-eight hours, relief is the result. It is that form of flatulency occurring toward the end of forty-eight hours, accompanied by refusal of the bowels to move, together with quickening and weakening of the pulse, that we have most to fear, as it frequently means septic peritonitis

Croton oil, per orem, with rectal injections of water and turpentine, and the introduction of the rectal tube, is the only hope for relief. Occasionally relief is obtained by turning the patient on the side. The cause of flatulence is unknown, and its treatment most unsatisfactory.

•• The care of drainage tubes is one of the most important parts of the after treatment. This is done under the strictest antiseptic precautions. If the tube is of glass, its mouth is thoroughly cleansed with cotton wrung out of hot bichloride solution; as is also the syringe, which is filled and emptied several times with the bichloride solution 1 : 1000, and then washed with hot, sterile water.

•• The long nozzle of the syringe is then carried to the bottom of the tube, the piston slowly withdrawn, and this procedure repeated until the tube is dry. The syringe is then washed clean with hot water; after which, bichloride solution is repeatedly drawn into it, and the syringe wrapped in a wet bichloride towel and kept until again needed. Every time the tube is cleansed, its mouth is well washed with bichloride solution. After cleansing the tube, clean cotton is placed over its mouth, protecting it from infection. With each dressing the tube should be twisted back and forth several times to prevent adhesions, which render its removal difficult.

“ When, after a few hours, only $\mathfrak{z}\text{ii}$ or $\mathfrak{z}\text{iii}$ of straw-colored fluid can be withdrawn, the tube should be removed; generally it is removed in from one to three days. Immediately following an operation the tube should be emptied every twenty minutes; it should never be allowed to overflow and soil the dressings. This is gradually decreased, until, at the end of twenty-four hours, once in three hours is often enough to clean the tube. The tube is withdrawn with a rotary motion, and the wound covered with sterile gauze, and drawn snugly together with an adhesion strip, over which the dressing is replaced.

“ If suppuration is present, the tube is cleansed every few hours, and washed out with boric acid solution. When the discharge subsides the tube is withdrawn, and the opening covered with cotton and allowed to contract. After the tube is removed the track may be washed with peroxide of hydrogen. It generally closes in a week or two; otherwise, it is chronic, and forms a fistulous track.

“ Gauze drains should be frequently changed. They are generally used in a bag tampon, forming a Mikulicz drain. The drains are packed into the gauze bag in strips, with one end projecting, and are removed one strip at a time. If in withdrawing the bag, omentum or gut fol-

lows, replace it with the forceps at once, and close the wound, with the ligature placed for that purpose at the time of operation, or with a piece of adhesive plaster.

“The dressing should not be disturbed until the eighth day, when it is removed, as are also the stitches. They are seized and pulled up with thumb forceps, and one side clipped with scissors, slight traction then causing the suture to slip out. After removal of the stitches the wound is bathed with bichloride solution and dried with cotton, wrung out of bichloride solution, care being exercised not to disturb the line of union. A piece of dry sterile gauze is placed over the incision, and the parts held together by several adhesive strips, over which, a strong binder is placed; this is generally all the attention required.

“If the incision suppurates, it is best to remove the sutures at once, allow the superficial parts of the wound to separate, and treat it as an open wound by disinfecting and packing. Stitch-hole abscesses must be kept drained; otherwise, both the temperature and pulse may run up. While suppuration lasts the dressings should be changed twice daily, and the parts thoroughly cleansed with peroxide of hydrogen and bichloride solution.

“For hemorrhage following an abdominal section there is but one treatment, and that is to

reopen the abdomen and ligate the bleeding vessels. The symptoms are the same as for concealed hemorrhage from any other cause. If the bleeding comes from separated adhesions, and is a free ooze, no alarm need be felt. However free at first, it will continue but a short time; consequently the drainage tube must be kept dry to favor coagulation of the blood and cessation of bleeding. The oftener the tube is cleansed the sooner the bleeding will cease.

•• If the patient has rallied well from the anesthetic, with practically a normal temperature, and, at the end of twenty-four hours, shows indications of collapse, together with a rising pulse and falling temperature, hemorrhage will almost certainly be the cause. The pulse is feeble, rapid and running in character. Unless the bleeding is checked these symptoms grow more profound, and great pallor, sighing, cold, clammy surface, and death supervene.

•• *Shock*.—Shock may be taken for hemorrhage, though the symptoms of shock exist from the first, while those of hemorrhage do not come on for several hours after operation; otherwise, their symptoms are so similar that it is difficult to differentiate between them. The treatment of shock is dry heat applied to the entire body, care being exercised not to burn the patient with the hot cans or bottles; whisky, ammonia, and,

above all, strychnine, given freely, one-twentieth of a grain every half hour, hypodermically, for two or three hours, and then every hour until the patient is better or shows muscular twitching.

“*Sepsis.* — A general pelvic and abdominal septic peritonitis, following abdominal section, is never relieved; the patients all die. For forty-eight hours it is difficult to decide that anything is materially wrong; and when the trouble is discovered the patient is beyond relief, and is dead before the end of the fourth day. Usually, for a time after the operation, the condition of the patient is good; then the pulse begins to creep up to 110:120 beats per minute, weak and rising, with the temperature ranging in the neighborhood of 100°.

“Vomiting from the anesthetic lasts usually beyond twenty-four hours, when the stomach has a rest of six or eight hours before the vomiting due to the sepsis begins. During this rest the pulse steadily creeps up, becomes weaker and thready; the temperature also rises, the abdomen becomes distended, and in spite of all efforts to move the bowels no indication of a passage can be obtained; the stomach rejects everything taken; the enemas are rejected; profuse sweating and cold-creeps set in, and the dull, heavy pains of septic poisoning supervene: the

patient is restless, tossing from side to side: the anxious facial expression deepens, and the patient assumes a hopeless condition. Before death the pulse is so rapid and weak as to be imperceptible; the temperature may rise to 107° and the body be bathed in cold sweat: the vomited matter is dark brown. No effort to secure a movement from the bowels should be spared. Whisky and strychnia should be given to the point of tolerance. Quinine in large doses often proves beneficial. The hypodermic needle and rectal injections must be largely depended upon for the administration of drugs. If at the end of sixty hours there is no doubt as to the complication, the only thing to be done is to render the patient's death as easy as possible by the use of morphia.

-- If an abscess forms about the stump of the pedicle, we have symptoms of sepsis coming on later and of a milder type. The abscess should be opened, washed out, and drained. The pulse and temperature fall almost immediately. Whisky, strychnia, and quinia should be begun early and administered freely.

-- *Fistula*. — The majority eventually close without much treatment: therefore, they should be treated expectantly for awhile, keeping the sinus clean, and at the same time looking after the general health. Peroxide of hydrogen is the

best preparation with which to keep the sinus clean. It is best not to do a secondary operation for the cure of the fistula under four months. When an operation is attempted, the sinus is irrigated with peroxide of hydrogen and bichloride of mercury, and the fistulous track dissected out, the belly closed, and a drainage tube left in for a few days. If chronic faecal fistula is present, the operation may prove a formidable one, as the opening in the bowel may be so low down as to preclude an operation. In all cases operated upon, the adhesions between the coils of intestines are to be carefully separated down to the opening in the bowel, when the edges of the opening in the gut are freshened and turned into the gut, and closed with Lembert sutures.

.. When the opening is high up and can not be closed, the bowel may be resected and an end-to-end anastomosis done according to the author's technique. The operation for chronic faecal fistula is a tedious and dangerous one, but offers the only hope of relief. The primary treatment of fistula is rest. Should fistula be discovered a few days after operation, while cleansing the drainage tube, it must be cleansed every fifteen minutes and the bowels kept quiet with opium for four days or more; then opened and kept lax. In a week the tube may be with-

drawn and the faeces be allowed to flow through the track formed by the lymph. Most faecal fistulae will close if properly treated by rest and cleanliness.

•• *Hernia.*—Several weeks after abdominal section, hernia may occur at one point and gradually spread, if untreated, the whole length of the incision; therefore, the longer the patient is kept in bed, the better, after operation. The hernia may be supported by a properly-fitting truss, or be operated upon. Great care is exercised in opening the abdomen at the seat of the hernia, as the bowel is generally adherent to the sac. The old incision is opened throughout its full length and the peritoneum trimmed off the edges of the muscle and the sac resected. The edges of the several tissues are brought together and closed as in any abdominal section. The patient must remain in bed from four to six weeks, the usual time being four weeks. During the beginning of the fourth week the patient is allowed to sit up in bed. She should not strain or lift anything for several months, and an abdominal binder should be worn for one year after the operation. Every woman who has had her uterine appendages removed suffers from symptoms of the menopause.”

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